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THE OXUS EXPEDITION.

From Major Herbert Wood's interesting communications to the *Daily News*, Colonel Stoletof's letters to the *Invalide Russe*, and a few other sources, we gather details of the progress of this Expedition.

The 'Perovski' steamer, with the members of the party on board, and a barge in tow, left Fort Kazalinsk in the early part of June, and after crossing the sea of Aral endeavoured to ascend by the Ulkun Daria or middle branch of the Amu, in preference to the Taldyk or Yani Su * channels, which lie westward and eastward respectively. The middle channel debouches into the sea by two mouths, the western of which is called Kitchkene-Daria, and, in 1859, when Admiral Butakoff† explored the southern part of the Sea of Aral, this channel conveyed the main body of the waters of the Oxus. But an important change has since occurred in the course of the stream, and now the navigable channel will be found to lie (as it did in 1848 and 1849) in the Yani-Su to the eastward. The 'Perovski,' however, being ignorant of this circumstance, proceeded up the Ulkun, taking frequent soundings, and making observations on the set and rapidity of the current. She traversed the Ulkun and the affluent which connects it with the Sarykul Lake, and arrived at Kara Tau, 70 versts from the mouth of the river. Here some of the party made their way overland to the fort of Shimbai, which is situated about 45 versts from the landing-place, and the rest ascended the river by native boats to Nukus. This mode of procedure was rendered necessary by the shallowing of the river, and the same circumstance convinced the commander of the 'Perovski' that it would be impossible to proceed further with his vessel by this route. He accordingly retraced his steps to the sea, and, turning eastward, coasted along the southern shore, making a detailed examination of its sea face, and entered the Yani-Su on the 29th of July. Admiral Butakoff, in 1859, ascended this arm for 40 or 50 miles, but was then stopped by a sort of dam, formed by a ridge of limestone rocks. This ridge has now completely disappeared, but its former existence may be traced in the presence of the Daukara Lake, a huge tract of swamps and tall rushes, about 1500 square miles in extent, along the eastern edge of which flows the Kuvun Yarma, as the channel is called where it first branches from the Oxus. The Yani-Su, except in one or two places, proved to be easily navigable. It is 100 feet wide at the mouth, with a general minimum depth of 15 feet, and a moderately quick stream. On reaching lake Daukara the water shallows to an average depth of 7 feet, the course becomes awkwardly tortuous, and the velocity of the waters in the bends increases to 6 miles an hour, while higher up in the Kuvun Daria the current at the bends attains a rapidity of between 7 and 8 miles an hour, and the width increases to 400 feet.

This eastern channel, about 200 miles in length, was successfully ascended by the 'Perovski,' which reached the main stream of the Oxus on the 5th of August. But it must not be assumed from this that the eastern arm will always be navigable. The Yani-Su itself may possibly remain so, the quantity of silt brought down by the stream being mainly deposited in the Daukara Lake, where, with occasional dredging, a channel might be kept open. But in Kuvun Yarma there are so many diverging streams, with heads increasing in size year by year, that a division of the waters may take place any day, and the navigation of the Oxus thus become an impossibility. Moreover, a trial must be made during the dry season before any definite conclusion can be formed.

However, it is a great achievement for the 'Perovski' to have ascended as far as Nukus alone, not to speak of her further progress as far as Petro-Alexandrovsk. Above this latter place difficulties cease, and Major Wood thinks there is nothing to hinder steamers ascending as far as Charjui (63° 20' E., and 39° N. about), or even perhaps Khojah Saleh in Affghanistan. The great obstacles are the inequalities of the river, which would necessitate a staff of local pilots, and the want of fuel. As a rule, the navigable channel will generally be found along the right bank, in accordance with the usual law of hydrology, which makes rivers flowing north and south follow the direction of the rotation of the earth, and hug their eastern banks. The left is pretty uniformly shallow, and in September and October, silts, shoals, and islands covered with waving grass and tamarisk jungle, interspersed with low willows, are formed in this part of the river; being mainly caused by the flow into the canals which branch off from the left bank. The second difficulty, scarcity of fuel, is met at present by burning the

* Also called Yani Daria, but not to be confounded with the channel flowing south-west of the Syr-Daria, which Sir Henry Rawlinson maintained was the old bed of the Jaxartes. The views of Sir Henry (which were opposed, however, by the late Sir R. Murchison and Colonel Yule) have recently received corroboration from Mr. McGahan's researches on the occasion of his journey across the steppes.

† The sketch map by Admiral Butakoff, reproduced in the 37th volume of the *Journal of the Royal Geographical Society*, is still the most trustworthy one of the delta of the Oxus.

gnarled stems and roots of the Saxaul (*Haloxylon ammodendron*), which is common enough on the Syr Daria, but of which a limited quantity only can be procured at Nukus, at 18*s.* a ton. This scarcity of fuel delayed the steamer on her upward journey. At Petro-Alexandrovsk the wood is still more difficult to procure, and this will probably give an impetus to the working of the coal mines of Turkistan, the coal of which goes twice as far as Saxaul.

The Russians hold at present three posts on the Lower Amu, and a fourth is being built. Shimbai, in the delta, is held by a small force of Cossacks, armed with sabre, rifle, and bayonet, and mounted on sturdy ponies; next comes the new fort of Nukus, which will be soon ready for occupation, and is surrounded by walls about 15 feet high, forming a square about 360 feet a side, and defended by a ditch all round, and four bastions for light artillery at the angles. A little further up is Nukus proper, a temporary station, inhabited by 1000 or 1200 officers and men; and 120 miles from the mouth of the river is Petro-Alexandrovsk, the principal Russian post of the Amu Daria district. The bulk of the troops here consists of a battalion of riflemen, and one of the line, occupying small barracks in a fine walled garden. Along two sides of it are wet ditches, and bastions have been erected at the angles, with some 12-pounders in them. A small town is springing up at a short distance from one side of the fort. There is talk of the Turkmen intending to cross the frozen river in the winter, and make an attack, but the present commandant is not one to be caught napping.

With a keen appreciation of the benefits to be derived from a study of the meteorological conditions of a newly-acquired country, Colonel Ivanoff has already established observatories at Nukus and Petro-Alexandrovsk, and, under the superintendence of the chief observer, M. Dorandt, the buildings were completed by the beginning of August, but some preliminary observations were taken early in July. Ten subalterns were placed at his disposal, and these showed such intelligence and aptitude for the work, that in a very short time they were able to render good service. The observations proved that the weather here in July is clear and healthy, the maximum being 95° Fahrenheit in the shade, and the minimum 59°.

The banks of the Amu, for about 50 miles above the delta, have little or no cultivation along the right bank, but above the Sheikh Jeli hills, timber and cultivation increases, and for more than 100 miles along the left bank are groves of mulberries, planes, and other trees, amid which are square fort-like enclosures of *pisé* walls, containing the homesteads of the agriculturists. In the open ground are fields of wheat and lucern, which alternate with millet, rice, or maize, while the orchards contain apples, pears, peaches, apricots, and melons of the finest quality.

The navigableness of the Oxus confirms the views of Sir Alexander Burnes, and, in face of the opposite opinion expressed so emphatically by Vámbéry, is a proof of the critical acumen of Colonel Yule, who supported his belief mainly on the traditions of its having formed once a commercial highway between Upper Baktria and the Caspian.

M. Severtsoff, in charge of the natural history section, has furnished some particulars of his journey in company with the botanist, M. Smirnoff, from Kazalinsk to Nukus along the shore of the Aral, with the object of investigating the circumstances attending the desiccation of that sea. He found that south of the Syr there are, for a distance of 67 versts, extensive alluvial deposits which at first present the appearance of a level expanse of dark loam studded with clumps of withered canes and tamarisks, and further south merge into sandy hills overgrown with thin grass. The bed of the Syr Daria appears to be subject to erosion, as it has ceased to cover lands which M. Severtsoff noticed, in 1857, were inundated at low water. He also remarked that the beds of former *aryks* or irrigation canals were above the level of the river. On turning his attention to the fall in the Aral Sea, he found that bays which deeply indented the sea coast are now completely dried up; shallows are forming islands; islands are becoming part of the mainland; the old coast-lines being distinctly marked by the different belts of vegetation growing on its borders.

Of kindred interest is the work of Colonel Tillo and his assistants, who, after comparing instruments at Pulkhova Observatory, commenced on the 25th of July to carry three lines of levels from the western shore of the Aral Sea to the eastern side of the Caspian. According to latest advices the work had proved exceedingly fatiguing, but by dint of twelve hours a day hard work they had already advanced half way.

The object of these various labours is the establishment of water communication either by means of the old bed of the Oxus or else a canal between the Caspian and the Oxus, and thence, if it should prove feasible, in a north-eastern direction, so as to meet the Yani Daria and thus effect a juncture with the Jaxartes. This project which would unite the heart of Russia with Central Asia by means of an unbroken water-line is one the grandeur as well as the political importance of which are sufficient to make us look for further intelligence with the keenest interest.

THE YARKAND TRADE.

THE *Gazette of India* of August the 8th, upon the report of the Commissioner for the development of the Yarkand trade, contains some important remarks by the Lieutenant-Governor of the Pánjab.

It appears that the value of the trade has been all along shown as more than double what it really was, by the simple expedient of reckoning twice over a bale of goods entering the district of Ladakh from one side and leaving it at the other—a method of calculation, which, as the Lieutenant-Governor remarks, "is perhaps likely to mislead." Thus, "the total value of the trade with Eastern Turkistan—though the greatest on record—amounted last year to less than 60,000*l.*, an amount which must be considered altogether insignificant. It is true that the sum total of imports and exports by the several routes increased in value from 158,480*l.* to 177,672*l.*; but the imports and exports" (through Ladakh) "being the same goods, the value of the transit trade is really only half the total shown above." The Lieutenant-Governor further points out that this "altogether insignificant" result represents all that the whole fostering power of the Government could do;

"though the development of trade between Yarkand and British India has received the careful attention of the British Government for upwards of six years, though transit duties have been abolished" (by the Maharajah of Kashmir, whom the British Government reimburses therefor), "and special officers appointed to watch over the interests of the traders"!

The gross value of this trade (statistical and actual) is as follows:—

	Statistical.	Actual (deduced).
1863	£24,000	£8,000
1864—1866	10,000	3,400
1867	55,000	20,000
1868	104,000	35,000
1869	129,000	45,000
1870	155,000	56,000
1871	125,000	45,000
1872	160,000	55,000
1873	178,000	60,000
	£940,000	£327,400

We have not any statistics of the outlay which has produced this result; but the expenditure on deputations and missions alone—those of Captain Grey, Mr. Shaw, and Mr. Forsyth—must have been great; the yearly expenses on the route—the Trade Commissioner and his establishment, the Government mule train, repairs and maintenance of roads and buildings—must be a heavy charge; but the only item of which we have any data is that of "construction of roads," regarding which the Lieutenant-Governor makes some suggestive remarks. It appears that of the three portions of the Yarkand road lying south of the Karakorum Range, the portion in Ladakh yet remains to be taken in hand, but that from the Ladakh boundary to the head of the Kangra Valley "an excellent hill road has been made, suitable for mules and possibly for camels, with bridges, bungalows for travellers, and supply depôts." Finally, an "enormous sum has already been spent, and is being spent in the construction" of two cart-roads in the Kangra Valley itself. One of these "has already been completed at a large cost, connecting Palampur with the railway at Jallandhur, a distance of about 117 miles"; and His Honour quotes the opinion of the tea planters (the persons most interested) "that this line of communication is amply sufficient for all trade requirements."

Nevertheless, another "costly road" is being constructed for a distance of 65 miles connecting Palampur with the plains *viâ* Pathankot. This is all complete except three bridges over mountain streams, estimated to cost 32,000*l*., respecting which Sir Henry Davies observes:—"If the Government of India is prepared to contribute from the Imperial exchequer the sum required to complete the bridges, the work will be taken in hand without delay; but in His Honour's opinion, so large an expenditure would not be justified by the prospects of the development of Central Asian trade *viâ* Kangra, Kulu, and Lahoul."

It must be remembered that the road from Lahoul to the Karakorum Range (about 150 miles) has yet to be constructed, and that, as pointed out by Sir H. Davies, when all the arrangements within our border are completed there still remains the worst part of the obstacle to this trade to be overcome. "The greater our experience of the routes between India and Yarkand, the greater do the difficulties appear in the way of establishing a satisfactory trade-route—owing to the length of the journey, the enormous altitudes to be traversed, the arid and unproductive character of a large portion of the country, the absence of population, and the deficiency of carriage and supplies. The expedition of last year, though aided by all the influence of the Government officials of British India and Kashmir, met with no small difficulties, and taxed the resources of the country, both as regards the carriage and supplies, to the utmost. If such were the case with an expedition proceeding with all the prestige and advantages of an imperial embassy, the successful performance of the journey by large caravans under less favourable circumstances must be considered problematical." When we observe that of the exports from India to Yarkand, in 1873, exactly half stuck fast in Ladakh till the following year, for want of carriage; and that the only remedy the Trade Commissioner hopes for is that in future Indian cattle will be taken the whole way (over a route the terrific difficulties of which have already destroyed the Yarkand carriage, and caused the above-mentioned failure); we may safely concur in the Lieutenant-Governor's opinion of the "necessity for caution in embarking in mercantile enterprises in regions so distant and inaccessible," where "formidable competitors for trade in piece goods and other articles of English merchandise are already in possession of the field; while the population of the country, though well-to-do, is scanty."

Let us suppose, however, the roads all made, carriage plentiful, grass and water provided on the eight marches where these necessaries are almost non-existent, the fearful distress of crossing elevations of 18,000 feet in some manner mitigated, what will all this avail if China reconquers her revolted provinces, or if, like the rest of Turkistan, they come under a Russian protectorate? In the first case we revert to the state of things antecedent to the Muhammadan rebellion, when intercourse was as completely cut off with Chinese Turkistan as with Tibet. In the second, we are met by heavy protective duties especially imposed, as at the present moment upon the Oxus, to retain for Russian commerce the command of the Central Asian market. Is either event impossible? Are the assumptions even improbable? Are we likely, or able, to interfere in either case? China is steadily and surely recovering herself. Chinese pertinacity has availed to crush the internal Muhammadan rebellion and the Panthay revolt; it is subsiding the Tungan rising; will Chinese pride leave the recovery of Kashgar and Yarkand unattempted? Again, may not cause of quarrel arise between the Amir of Kashgar and Russia, as between those of Khokand, Bokhara, or Khiva and the same empire, and with the same results? Again, the Amir is not young, the provinces he has erected into a kingdom were districts before, and are only held together by his iron hand. His death will be the probable signal for disruption and anarchy, with the certain result of the annexation of the various provinces to either Russia or China.

But there is a branch of Central Asian trade, one shortly described in the February (1874) number of *Ocean Highways*, on which a *moderate* expenditure would be immediately reproductive. A hardy commerce which has existed for a century under the most

discouraging circumstances (instead of being a recent creation of our own), and the value of which by the Gomul route alone was considered by the Lieutenant-Governor of the Panjáb in 1871 to be not over-estimated at half a million sterling (actual, not statistical), and to be then considerably depressed from various easily remediable causes. The total value of the trade by all four of the great routes into Affghanistan is at least a million sterling.

What has been done by the Indian Government to develop a commerce of which the germ (if an existing trade of 1,000,000*l.* can be called a germ) displays such exuberant vitality as to defy all the blighting influences detailed in *Ocean Highways*, and in the India House Report of Indian progress for 1872? Emphatically *nothing*. The profits of the trade are such as to attract constant accessions to the ranks of the Povindah merchants from among the more venturesome mercantile spirits of the Indian frontier—notwithstanding the exactions and losses described in *Ocean Highways*, and the efforts of the Russians to exclude Indian and British products from Turkistan. It would seem that every political and mercantile consideration would lead us to take advantage of such an opening, and to adopt measures to develop it, somewhat similar to those already described in the case of the Yarkand trade. The abolition of harassing imposts, and the prevention of annoyance and oppression of the traders *en route*, could be negotiated as easily and cheaply with the Amir of Cabul as with the rulers of Kashmir and Yarkand. No physical difficulties have to be overcome; but if the British Government wished, the Amir could and would, in accordance with his undertaking at Ambala, in 1869, improve the roads. The traders have their own arrangements, and require no kind of assistance in the matter of carriage or supplies.

The real and only great difficulty of the routes is their insecurity on account of the turbulent tribes through which they pass. The mountaineers want payment for the right of way, and they take it sword in hand. The evil is one peculiarly easy of remedy by the combined action of the British and Cabul Governments. The plan proposed is to protect the disputed portion of the main (called Gomul) route (that immediately upon the British border), by posts at each stage, held by small parties of the very tribes to be restrained, members of which will escort the caravans from post to post. The posts would be paid by the British Government from funds raised by a small tax which the Povindah merchants already pay at the Indus, the proceeds of which have been hitherto credited to the general revenues; but, besides this advantage, the tribes would receive from the merchants themselves certain pass dues, at a tariff fixed by the British Government. These posts would be supported and watched by a detachment of the Cabul troops, conveniently posted to command the route, and would be supervised and commanded by a selected frontier chief, appointed Pass Warden on the part of both the governments.

Practical, cheap, and simple, as these measures are, and evidently certain as they are to develop a trade which is at present dwarfed by the impossibility of passing through to India, save by collecting the successive caravans till they form the strength of an army, and can push through the passes by main force; they still hang fire. Whether it be advisable or not to spend enormous sums on creating a trade with Yarkand, it must certainly be so to lay out 2000*l.* a year to facilitate an existing commerce through Affghanistan, if for no other reason than to open routes, and to encourage a class of carriers who have been, and may again be, of the utmost military importance to us.

X.

JESALMER; A REMINISCENCE.

"A fort has Delhi, Agra, too; a half one, Bikanír:
But best of all the Bháti built, the fort of Jesalmír."
Translation of old Local Legend.

IF the strong arm of the military executive had nearly done its work in striking down and crushing the directing and sustaining power of the Indian Mutiny before the close of 1858, there was a further serious duty to be fulfilled by the local government and the law, in preventing resuscitation of the scattered and disorganised elements of rebellion, as late as 1859. When Hercules destroyed the Hydra, his labours would have been incomplete had not a zealous assistant burnt, with a hot iron, the bleeding roots which supplied new heads to the dying monster; and as the avenging army of India may be fitly typified on this occasion by Hercules, so may the civil administration lay claim to have displayed the co-operative vigour of Iolas.

At the dawn of 1859 there was a great stir in the Bombay Presidency as to the movements of Tantia Topee, one of the last of the rebel chiefs who had won any special notoriety during the disturbed period of which we speak. Among other reports it was stated that he was endeavouring to escape his pursuers by crossing to the right bank of the Indus, and passing into the countries westward of that river. Now, a glance at the map will make it apparent that to reach the Indus from any part of India between Delhi and the Nerbudda, the fugitive or traveller would have to cross at least some part of the Thur or Indian desert.* One of the arrangements, therefore, to meet the occasion was, not unnaturally, an order to detach a squadron of Sind Horse from Jacobabad, that, crossing the river, it should move into the country eastward of the valley of the Indus, and closely watch the several lines of traffic, east and south, communicating with the more fertile districts of Rajputana, towards Central India. And as it happened that the camp of the Commissioner in Sind was at Amarkot, an important station bordering upon the Thur in the south-west, in February, 1859, it was judged advisable that one of the officers then in camp should proceed, in anticipation of the arrival of the squadron, and in furtherance of its objects and progress, to Jesalmer, a city which, from its beauty, old associations, and, to some extent, central position, might be justly considered the capital of the desert.

Notes of impressions derived at the time of these occurrences, however roughly recorded, will have a certain value, if only in calling attention to a most interesting, and too little explored city and *entourage*.

* For a detailed account of the Thur, see Sir Bartle Frere's exhaustive paper on the "Runn of Cutch and neighbouring Region" in the *Journal of the Royal Geographical Society*, vol. xl., 1870. The map there used in illustration will apply in the present case, with the addition of the roads from Amarkot to Jesalmer, and from Jesalmer to Rohri.

The following extracts have at all events no pretension to take the place of a formally prepared narrative :—

"JESALMER,* *15th February*, 1859.

"We reached this city last afternoon, much about the time that we left Amarkot on the Wednesday, thus making out our journey in exactly five days and nights. Annexed is a memorandum of the stages. . . . Thanks to the old Soda Thakúr, Hemraj, we managed exceedingly well at the several stations on the road. The freemasonry of opium appears to be the popular religion, and though my tastes were heretical, I found it politic to be orthodox.†

"After Gadra, a very few miles brought us into the Jodhpur limits. We had been joined by an additional *sowár*, and two Sodas, but the former only remained, as I considered his presence quite sufficient. Old Khanji and his attendant made a grand display at starting; but the years and lame mare of the one, and the liliputian beast of the other, took the respective cavaliers to a village off the road, after an hour's marching; and though the Sancho Panza made his re-appearance at Harsáni, our night's encampment, and reported his master's arrival, I begged he would not weary his aged limbs any more in my cause. Our party now consisted of my Munshi and servant, the Soda Thakur, two of the District Officer's *sowárs* and a peon, two Haidarabad *sowárs*, and two amateurs named Ramzan and Nihar—eleven in all, myself included.‡

"We traversed about 40 miles of country in Jodhpur, coming into the Jesalmer boundary at Rinda, where there is a Khosa picket, a recent measure which appears most appropriate and well-timed. I think some such plan might be adopted on the Sind-Bháwalpur frontier, to stop depredations in that quarter, at least within Jesalmer bounds.

"The people in Jodhpur were not uncivil. A soldier at Harsáni got everything we required, at an advanced hour of the night. He turned out all the small dealers to supply us, and I had the benefit of a cot in the vastest bed-room available, which, on this occasion, as on many others, was the open air, under the canopy of heaven. . . . .

"We halted at Jenkli, a village of Fakirs, in the Jodhpur limits, where I met with an old acquaintance, one Mulla Chárán. . . . . All Chárán villages are, I think, free grants in Jodhpur, and, generally, in Hindú states. The Rajah's officials interfere in no way with the interior economy of these land alienations. . . . . Mulla is an extempore poet, after the fashion of his tribe. On my mounting the camel to leave Jenkli, I observed the Jesalmer *sowár* on foot in front of me leading his beast. The reason was not evident; but, looking behind, I observed that all the party, except my servant, were doing the same. I asked Munshi Khudadád what was the matter. He replied that the town was one of Fakirs, and it was not the *(húkam)* order to ride in it. 'No, no!' cried out old Mulla; 'there's no *húkam* in the matter; it's only a custom.' Had I not gone so far, it is more than probable I would have forborne to break the rule. As it was, and having unconsciously mounted, there was perhaps no real occasion for me to alight; so on I went in at least unpremeditated transgression. But it was a seemingly ungrateful return for Mulla's attentions and especially good rice milk.

"The Jesalmer country shows very sparse cultivation. Occasionally a low patch, fed by recent rain, is found covered with stumps of the corn commonly known in India as *bajri*. I was informed that wheat is grown, but I have seen no nearer approach to it than this. The sandhills are not so numerous or heavy as I expected to find them. Rather should the country between Rinda and Jesalmer be described as plain, intersected at intervals with sandy and stony ridges. As we near the city, stone becomes more and more abundant; but in no place is the road difficult or impracticable for any distance. Perhaps the longest stretch of sand is in the undulating tract between Modah and Kotah.

"Wells and tanks are, as a rule, plentiful; but many are dried, or in process of absorption, owing to the want of rain the preceding year. The desolation of some of the villages is pitiable. House after house seems to have been either only half built, or abandoned on completion. Miles may be counted by tens before a human being comes within sight of the traveller. Yet the solidity of the structures, compared with the mud houses of Sind, and huts of the Thur and Jodhpur, is remarkable.

"The Chatris* and Lortis are, some, very graceful. The former have a pleasing and picturesque appearance among trees or green foliage of any kind. The effect of the yellow stone is considerably heightened by the fine carving and ornament. The wild trees and vegetation observed are *kirir* (caper), *babar* (acacia), *kandi* (thorn), *bēr* (jujube), *ak* (milk bush), and the grasses of the Sind Desert.

"On my arrival, I found a tent ready pitched, and a Munshi came out to usher me in; but I had written beforehand to Himmat Ram to hire a house, and thought it better to accept the alternative of the town residence, and so have all my people about me. There was no 'Istikbal,' or ceremony of reception on

* Jesalmer, said to have been founded by Jesal in A.D. 1156. Colonel Tod interprets *mér* to mean a rocky oasis, in the traditional nomenclature of the country.

† The march may be reckoned in round numbers at 150 miles. It comprises three political divisions of territory :—One on British ground, of 59 miles, in a direction east-north-east; one through the Jodhpur state, of 35 miles, somewhat east of north; and the third through the Jesalmer state, of 56 miles, almost due north. In the first of these, of the three villages meriting note, Bisoni and Itkan are off the road, and Gadra is the terminal point. In the second, the Mangwál village of Raneesir, the Bhatti villages of Mugrah and Harsáni, the Brahman village of Juriah, and Jenkli, of the Chárans, or bards of the desert, should all be recorded. In Jesalmer are the villages of Kotah, Kapuriah, Ramasir, Keeto, and Damrowa, of which Ramasir is Charan, and Damrowa Brahman. For a regiment marching from Gadra to Jesalmer, seven stages * might be given where water and supplies could be made readily procurable. Soldiers should not, however, be allowed in the Chárán villages, and as little as possible in any others.

‡ Soda is the name of a tribe of Desert Rajputs, and the word "Thakur" is used among Rajputs much as "Sardar" is prefixed, or "Khán" affixed, to Muhammadan names, not always less questionably than "Esquire" in England. The reader will understand that "Bhatti," "Mangwal," and other probably unfamiliar tribal distinctions apply to local communities in Rajputana.

* Raneesir . .	14 miles	Keeto. . . .	9 miles
Harsani . .	10 ,,	Jesalmer. . .	15 ,,
Jenkli well. .	10 ,,		
Kotah . . .	17 ,,	Total. . .	91 ,,
Seetorai. . .	16 ,,		

* Sepulchral monuments eminent in Rajputana.

the part of the ruling powers; for I do not believe they had the remotest notion who I was, or what was my business. . . . . After presentation of my letters of introduction, the messages and compliments became thick and liberal. The authorities had been yearning to see me for months and years; everybody and everything was to be at my disposal, and the Regent would come and pay me a visit at my quarters. He came early this morning, and I am now (3 P.M.) about to return the visit to the Maha Ráwal himself, having agreed to be fed for the occasion in the palace. I hope to continue this evening with a satisfactory account of my reception. . . . .

"8 P.M. The visit and dinner went off with considerable *éclat*. A forage-cap without the peak, a paletôt with the Medjidié, a sword, and the Regent's horse, magnificently caparisoned, gave me a certain amount of dignity which I had hardly anticipated, and we passed through the streets of the town up to the ramparts and citadel, amid a not unpleasant popular excitement. What much pleased me was the manner of the townspeople. There was no look of 'what are *you* doing here?' so commonly noticed at such times, especially among a Rajput population. Many groups made ready salams, and there was certainly something which breathed of welcome in the curiosity aroused at a stranger's visit. The portly figure of the Regent was soon visible at the entrance to the palace, and he ushered me, in a most friendly manner, into the royal presence. The Maha Ráwal is a beardless youth of fifteen, looking full nineteen years of age, tall, of stout build, and handsome in a peculiar style. My own opinion of him, from one interview, is that his intelligence is that of animal instinct, and that the *ingenuæ artes* would be too distasteful to him to admit their application. The question would be what to substitute in their stead to mollify his nature, and prevent the ingress of the brute passions. The countenance has much of haughtiness; there may be a tendency to sullen ferocity, if pride be curbed. The face is full and speaks in the eye. The manner is awkward and restless. The lips scarce utter a word. The outward action is that of an automaton, but is not boyish. I sat by his side, nearly touching his *gadi* (throne), but the coldness or shyness of his manner rendered my discoursing to him brief and far between. The Regent uncle sat at some distance off, and two Munshis in front of his highness. These two Munshis are the mild pillars of the Jesalmer state, one being the Minister of the Interior, in the sense of living with the reigning family in the fort; the other of the Exterior, having his dwelling in the town, and attending to the wants of strangers. The first is a Bhatti Rajput, the second I believe to be a Bhatti Bania. We had a long conversation, *i.e.*, the Regent, the Munshis, and I; and the presents were produced and admired with intensity. After the darbar the old gentleman took me to dinner, and the news-letter from Ajmer was read (while I dined) at my own request. After dinner we returned to the Maha Ráwal; *pan supari* (betel-nut) was produced, *atar* communicated from one to the other, and we separated on very good terms. I reached home on the regal palfrey just before dark. . . . .

"I can hardly describe to you my agreeable impressions of this city from a picturesque point of view. It is really a *bijou* of its kind. The elegance of some of the buildings, the beauty of the ornamental fronts, and the exceeding taste in the disposal of the premises, are remarkable. The archways on either side of the main street, and approaches to the citadel, would form a background for an Indian Thousand and One Nights. Government might well expend a few hundred pounds in photographing the more salient points of this unique pictorial display. Indifferently as I can attempt to render a landscape, it is impossible to resist the view at my window. . . . .

"*16th February*, 1859.

"This morning was taken up in an inspection of the Jain temples within the fort, and of the late Dewan Salem Chund's house in the town. The first are specimens of truly gorgeous yet graceful architecture. I never remember to have seen such carving. Many women were at prayers. The various lights and shades exhibited in our transit through the galleries were exquisite. Daylight partially admitted upon the carvings of five centuries ago, and lamp-light upon the myriad idols beneath, produced quite a dramatic effect. The Brahman temples I did not see, but they are not reported of in comparison with these.

"The Dewan's house is curious and handsome. The stone of the upper stories is very tastefully carved, and the higher part of the building forms a prominent feature in the general picture of the town.

"From the Jain temples, we proceeded to pay the Thakur *par excellence*, or Regent, a morning visit. He showed me all over his quarters in the citadel, and very snug and airy they are. Much as I wished to consult him on one or two matters, he looked too well-to-do and comfortable an old gentleman to get much out of in the way of severe diplomacy. We had a chat for a short time, during which was exhibited an umbrella, with gold fringe ornaments and handle, said to be 5000 years old! I was also favoured with an inspection of the portrait gallery of the Rajputana rulers. Udipúr bears a great family likeness to Jaipur, and Jodhpur to Jesalmer, and Jaipur to the Nawab of Tonk; and all are so like the figures on the wall of my lodging-house, one of whom does heroism from an elephant's back, and another smells roses in an impossible position, that I am tempted to believe all artistical creations in these parts are limited to one family.

"In the afternoon, the 'Minister of the Exterior' took me to a new tank, called the Gaj Rup Ságar, where the Thakur has been effecting great improvements, both ornamental and useful. A tunnel has been bored through the rock adjoining for a distance of about 500 yards; the sides have been built in with great labour, are faced with the Jesalmer stone, and cut with the usual precision. From thence, my cavalcade passed across country to the Bari Bagh. This is about 4 miles from the town, and is well worth a visit. I know not that it can be better described than as a long, low valley between limestone rocks, part of which is divided off by a stupendous stone-faced *band*, the top of which is broad enough and level enough for a chariot race, and the base of which is considerably broader. On the one side of this *band* is a very sensible and refreshing garden, full of mango and peepul trees, bērs, plantains, limes, oranges, and vegetables and flowers of all sorts. Fine stone-faced wells abound, so that water is for a time abundant, independently of the chances of rain.

Higher up the valley is the village of Bari, whence the villagers bring vegetables for sale in the town. On the upper part of the rock on one side is the burial place of the Ráwals of Jesalmer, a little colony of 'Chatris,' the later of which show no signs of art decadence. That of the present Ráwal's mother, and his father, Gaj Singh, surpass in elegance the whole. I am afraid that I can better appreciate than describe beauties, whether animate or inanimate, or would attempt to render the lotus-like fall of the lady's Chatri shading her tomb. Two or three generations on, I came upon a handsome cenotaph, showing the carved figures of a Maha Ráwal and his three wives, all of whom had sacrificed themselves in the flames at his demise. The sculpture was sufficiently good to admit of moralising on the horrible superiority given to man, in thus making his death the signal of destruction to the females of his household; and the form of this chief looked fiendish even in cold marble.

"On my return to the town at nightfall, a letter for the Maha Ráwal was opened before me by the Munshi. It announced the departure of the Sind horse (200 men), on the 9th instant, *en route* to Rohri and Jesalmer. I much apprehend that the collection of supplies between Mithrao and Gotaro has not been effected, owing to the shortness of the notice given; but they assure me that orders were sent out on the subject, on the 13th. The wretchedly barren state of this country, scarcity of rain during the past year, and the absence of an organised *tappal* (post), make it imperative on any body of troops, marching suddenly towards Jesalmer, to provide themselves with three or four days' provisions on leaving Sind; and as much water as they can carry in leather bags or skins, taking advantage of every well on the road to replenish, and water the cattle. The authorities here are not wanting in will or energy to serve our Government, and their whole desire, in dealing with us as individuals, appears to be to give satisfaction. A Kardar started last night to facilitate the progress of the detachment.

"17*th February*, 1859.

"Some time ago there was a celebrated Seth of Jesalmer named Guman Chand, who had five sons. These five sons were named Bahadur Mull, Sowaia Rao, Mangana Ram, Zoráwar Mull, and Partab Chand. Bahadur Mull's son, Dán Mull (at Kotah), Sowaia's grandson Nat'han Lal, Mangana's son Babud Singh (at Ratlam), Zoráwar's son Chandu Mull (at Udipur), and grandsons Ganbir (at Udipur), and Jindan Mull (at Jodhpur), and Partab Chand's two sons Himmat Ram and Jeit Mull, appear now to be the heads of this firm. The two last named are here, occupying the family residence, and showed me over their quarters this morning. Their *hawéli*, or set of houses, is entered by an archway which divides it off from the rest of the town, and tells a tale of opulence and luxury well worthy of attention.

"The rooms occupy four sides of a hollow or open square, and are built up to four and even five stories, inclusive of the ground-floor; staircases, and everything fixed and solid, of the Jesalmer stone. They are carved up to the very top of the house, sometimes simply, sometimes in the most fanciful and varied manner; never vulgarly. The stone, or indigenous work, is faultless. Set that aside, and the whole inner arrangement is semi-barbarian and absurd, *to our notions*. Rooms either wholly wanting in furniture, or choked with mirrors and pictures, chinaware and European nicknacks of the most paltry kind, show a wonderful perseverance in collecting rubbish and tinsel, but *voilà tout*. The portraits are of European ladies in short-waists, young Lakes or Cornwallises, a Princess Charlotte or two, and the different rajahs and chiefs of Indian reputation. The other pictorial subjects are taken chiefly from the Indian mythology, in which Krishna and Mahadeo seem the prominent figures; or, occasionally, are French, treated by French artists. One English theme has been so popular that it has been thrice represented by some native aspirant: it is Darby and Joan, smoking and drinking together, with the words 'Oh! the days when we were young.' This was an evident favourite of the owner of the house. There was a Rustam and the Deo Safid; also a king of Persia, which recalled to mind the Parsi shops at Karachi. My good and esteemed friend Pestamji has certainly one of these pictures.

"This afternoon we went out, accompanied by the 'Exterior,' to see more gardens, wells, and tanks. Our first great sight was the Mulla Ságar Well, with gardens and country seat of the Maha Ráwal. Distance about 6 miles in a south-west direction. The well is immense; about 70 feet in depth, the mouth about 40 feet square, and the descent by steps on all sides, the width gradually decreasing until the water is attained. This, and the adjoining residence, appears to have been the work of Mvolksy, the predecessor of Gaj Singh, father of Kaisar Singh. The whole is exceedingly tasteful and well laid out. Flowers and fruits were tolerably plentiful.

"From here we returned *viâ* the Amr Ságar Tank, faced with the usual solid masonry, and adorned by the villa and garden of the Maha Ráwal, a fine Jain temple, and the new villa and garden of Seth Himmat Ram. The last was well worthy of a visit. This wealthy gentleman is now building a residence, a private Jain temple, with solid vineries and garden fixtures, in a Rothschild style of outlay. A beautifully white marble chair, made in Jeypur and of Jeypur or Jodhpur marble, is one of the most striking objects. Fountains, paved walks, balconies, flowers, fruits, vegetables, here, there, and everywhere meet the eye. I confess to prefer Covent Garden; but still all this is very beautiful, and Himmat Ram undoubtedly cuts out the Maha Ráwal in magnificence.

"The number of stonemasons has been reduced considerably by British railway agents; and I was visited here by a stout Munshi, who appears to be doing his utmost to export the best workmen to Sind. Some 150 may have already gone. The carving is well and easily done, the stone being sufficiently hard to prevent chipping."

Five days afterwards, the Sind horsemen arrived. The writer had not left Jesalmer, and was able to accompany them, four marches eastward, to Pokrun in the Jodhpur state, where all were treated with great civility by the Thakur. This chief had been represented as a kind of recusant baron to his liege lord the Rajah; but was found, on acquaintance, to be a fine old Rajput country gentleman, living in a snug and strong fort and town, and possessor withal of a goodly stud and stables. The shaggy-coated ungroomed horses, kept purposely in a dark place, and in loose boxes, presented a characteristic feature of native training, and

supplied a picture not easily forgotten. Pokrun offers an advantageous position for watching and guarding the approaches to the Indus, having open roads to Multan and Delhi on the north, Jodhpur east, Balmair south, and Sind west.

Hence the return journey was commenced on the 3rd March, Jesalmer being revisited *en route* to Rohri on the Indus. The passing stranger was again most hospitably entertained in this exceptionally handsome district capital. The courteous Regent again made a personal call; and as his guest was ailing, he sent him limes from his own garden, and frequent messages of kind enquiry; insisting on his further stay until the afternoon of a second day.

The distance from Jesalmer to Rohri* was reckoned at about 150 miles, over a sandy desert tract, not wanting in wild vegetation or material for firewood, or without occasional wells, but very desolate and wearisome to the traveller. There was no village worthy the name until within easy reach of the river, but there were mud forts at long intervals apart, and three shops at about 40 miles, two more at nearly 70, and a lesser store at about 100 miles. The character of the country was monotonous undulation: it was as it were a model of the ocean in sand; still, yet under an agitating influence, for the hollows were deep and the ridges high.

Fifteen years have passed since the period of the journey above noted; and there have been changes in Rajputana as elsewhere. The young Rána of those days died in June 1864. His successor, though recognized, was not fairly installed until late in the following year. A regency appears to have been the popular and natural form of government. It is much the same principle as prevails in Oriental states and provinces where a minister is the virtual ruler.

Visits of political agents to Jesalmer have been more frequent of late years. In the latest reports of the Rajputana States (1871-72), are the following passages:—

"We met the Maha Ráwal at his capital, 'a small but wealthy and handsome town.' He is a young man of quick temper, good disposition, amenable to reason, but uneducated and inexperienced. His highness promised the political agent to do his best to check his predatory subjects, but urged the disobedience of his Thákurs as well as his own poverty, consequent on famine and drought, as his reason for not being able to keep up a sufficient force to guard the frontier. . . . The town of Jesalmer is described as built of what appears to be sandy freestone, the dry air giving it a fresh appearance, and making it look unusually clean and new. The elaborate carving on some of the houses is not to be equalled in any of the Rajputana towns in purity and variety of design and beauty of material."

We may hope that a photographer will accompany the political agent on some future visit: for the place is really worth a little trouble and expense, quite independently of administrative or political considerations.

* The most interesting object on the way, was the site of Lodrova, the ancient capital, about 10 miles north-west of Jesalmer, and off the main track: now a town of some eighty houses, with twenty shops.

ON HUMAN AGENCY IN THE DISPERSION OF PLANTS.

IN the May (1873) number of *Ocean Highways*, we discussed the influence of icebergs, rivers, and currents in the dispersion of plants. In the hope of eliciting further information on the subject, let us now take stock how far another agent has been instrumental in accomplishing the same end. *Man*—the agent most recently and in fewest numbers at work—has, perhaps more than any other, helped to carry the plants of one region to another, and to confound the original distribution of species. Wherever he goes he carries the seeds of plants with him—the merchant in the packing of his goods, the colonist with his household gods, and, more directly, among his cultivated grains, and the march of his armies over the world might be traced by the plants which have sprung up in their tracks. The most carefully cleaned grain will contain the seeds of the weeds which have grown along with it, and which, like "ill weeds which spring apace," propagate rapidly until they gain a footing, and either maintain it, or, in many cases, maintain it to the prejudice of the indigenous flora. The seaman brings plants in his ballast from every distant land—the climate of which is often similar to that of the land on which he shoots it to make room for his merchandise, and accordingly every botanist knows that there are numerous foreign plants to be looked for in any locality where ships are in the habit of discharging their ballast. Since the extensive introduction of foreign wools, in the vicinity of localities where this wool is washed and bleached many plants of the wool-growing countries have sprung up. De Candolle noticed this long ago in the vicinity of Montpellier, and mentioned that in his time there was scarcely a year in which foreign plants were not to be found naturalized in a wool-drying ground (Porte Juvenal) in the vicinity of that city. Among these naturalized plants are *Centaurea parviflora*, *Psoralea palæstina*, and *Hypericum crispum*. Since De Candolle's day various botanists have successively kept note of what plants sprung up, until now the list reaches the surprising number of 438—the species mostly belonging to the European coasts of the Mediterranean, whence most of the wool comes. However, representatives from Algiers, Morocco, Syria, Egypt, Asia Minor, North and South America, have presented themselves, including some new species, the native land of which is yet unknown. Near Louviers M. Bocquillon gathered out of Australian wool a great quantity of the fruits of Leguminosæ, which produced under his care numerous plants.* In every woollen factory, in the wool-cleaning rooms, heaps of the fruits of plants may be seen lying, and as in some cases these are sold to the farmers as manure, numerous foreign weeds may spring up in their fields. Planchon has, however, shown that though those seeds brought in wool to Montpellier give a varying character to the flora of the neighbourhood, yet only six species seem fairly naturalized and common. Mr. Gilbert Stuart† has more recently observed similar facts regarding the vicinity of Galashiels, where there are extensive wool washing and drying

* *La Vie des Plantes*, p. 269.
† *Trans. Bot. Soc., Edin.*, vol. x., p. 170.

works. Among others, he found naturalized on the banks of the Tweed and the Gala the following species, some of which are rare even in England, some new to Scotland, while others are entire strangers to Britain:—*Camelina sativa, Lepidium ruderale, Saponaria officinalis, Silene anglica, Medicago maculata, M. denticulata, Lathyrum hypssopifolium, Polycarpon tetraphyllum, Daucus gummifer, Cacaulis ducoides, Erigeron acris, Centaurea solstitialis, Xanthium spinosum, Amaranthus Blitum, Chenopodium murale, Setaria viridis, Apera Spica-venta, Polypogon monspeliensis*, &c. Altogether more than forty species were found. Plants will escape from botanic gardens and get scattered all over Europe. In Linnæus's day the fleabane or Canada thistle *(Erigeron Canadensis)* had been seen scarcely a century in the *Jardin des Plantes* at Paris before it was carried by the winds over France, the British Islands, Italy, Sicily, Holland, and Germany.* The same observation might be made regarding various species of *Mimulus* especially *M. luteus*, which was introduced from North-West America, by David Douglas, not forty years ago, and is now scattered over the British Islands from Cornwall to the Orkneys, where I have picked it—to all appearance (had the contrary not been known) wild. Similar instances could be multiplied to almost any extent, but the bearing of the foregoing is self-evident. When we consider how recently the flora of Europe has been carefully studied, we may imagine how many plants crept in from other countries without being remarked, and are now ranked as indigenous species. The same intermixture is going on in countries the flora of which is imperfectly known. In hot and ill-cultivated countries such naturalizations take place more easily. For instance, Wildenow mentions *Chenopodium ambrosioides*, sown by Mr. Burchell on a point of St. Helena, multiplied in four years to such an extent as to become one of the commonest weeds in the island. The feather-like seeds of *Asclepias carasavica*, introduced from Otaheite into New Caledonia as the stuffing of a bolster, have now multiplied that plant to such an extent as to cause serious uneasiness to agriculturists. In the same island the common couch-grass, introduced a few years ago from Sydney, whence it came from Europe in the packing of some goods, has now sprung up in such abundance as to be rapidly killing the native grasses. The thorn-apple *(Datura Stramonium)*, a plant of the East Indies and Abyssinia, more than a century ago, had spread as a naturalized plant through every country in Europe, except Sweden, Lapland, and Norway, through the aid of gipsy quacks, who used the seed as anti-spasmodics or frequently applied them to more questionable uses. The same plant is widely spread over the United States. To such an extent has this gone on in certain countries, that in the Cape of Good Hope, for example, there are more naturalized introduced species than all the native ones put together. Finally, I am informed by Professor Archer, of Edinburgh, if further proof of the agency of man was necessary, that *Œnothera biennis*, originally introduced from America in ballast, is spreading all over Europe, forming a beautiful addition to the European flora.

In the United States it is a fineable offence to permit the Canada thistle to perfect its seeds. In Denmark the same law prevails in reference to the corn marigold and the common thistle. In the early history of Scotland whoever "poisoned the king's landes with weeds, introducing thereby a host of enemies," was denounced as a traitor. In Ireland, Canada (including British Columbia), and Australia, similar laws are in force in reference to the eradication of thistles. In St. Helena—at the time of its discovery in 1501—there were not found over sixty species of plants. Its flora now comprises 750 species, though allowance must be made for the more minute search of later times. These plants were introduced with seeds, &c. A collection of the weeds of Upper Egypt, and the gardens of the Bosphorus, were found to be identical with those growing under the same conditions in New England. The change from one locality to another is affected by a thousand circumstances. The herbs, which form so important a part of the *materia medica* of the Eastern States of America, spring up along the prairie path just opened by the caravan of the settler. The herbarium of the botanist may accidentally sow seeds at the foot of the Himalayas, or on the plains that skirt the Alps. The straw and grass employed in packing the sculptures of Thorwaldsen were scattered in the courtyard of the Museum at Copenhagen, where they were deposited, and next year there sprang up no less than twenty-five species of plants belonging to the Roman Campagna.

How armies help to scatter plants is shown by the fact that in the campaign of 1814 the Russian troops brought, in the stuffing of their saddles, seeds from the banks of the Dneiper and the Don to the valley of the Rhone, and even introduced the plants of the steppes into the environs of Paris. The Turkish army in their incursions into Europe brought Eastern vegetables in their train, and left the seeds of Oriental plants to bloom on the ramparts of Buda and Vienna. *Lepidium Draba*—a plant of Central and Southern Europe, and temperate Russian Asia—was introduced into England in 1809 by the returned troops from the disastrous Walcheren Expedition. Many of the troops disembarked at Ramsgate, and the straw of their mattresses was thrown into an old chalk-pit belonging to a Mr. Thompson, from whom the weed, now troublesome and spread over many parts of the Isle of Thanet, was long known to the country people as "Thompson's weed." In 1872 the attention of the French Academy of Sciences was called by M. de Vibraye to the fact that numerous plants, chiefly from Algeria, and other parts of the Mediterranean coast, which had been used for forage by cavalry and artillery horses, from beyond the sea, employed in the Franco-Germanic war, had sprung up on the fields of camp and other ground occupied by the armies. These plants, though from warmer countries, were getting rapidly naturalized, and flourished vigorously even in the most barren spots, transforming themselves into natural meadows. In the vicinity of Strasbourg, M. Buchinger found, on examining bundles of hay served out to some cavalry horses, in August 1870, eighty-four species of plants belonging to Algeria. On examining the meadows in the following spring two exotic *Centaureas* were discovered, and subsequent investigation showed that many more were continually springing up. Most imported species were found in the Department of the Loire and Cher, and along the right bank of the Loiret, the old racecourse of Blois, and other

* *Amœnitates Academicæ*, vol. ii., p. 409.

places frequently occupied by troops. In March, 1872, young plants had sprung up near Blois and Orleans, on barren sands, where from time immemorial nothing had grown but a few stunted weeds. Altogether, up to the date of M. de Vibraye's communication, no less than 157 introduced species have sprung up, these including fifty-two *leguminosæ*, twenty-eight *graminaceæ*, twenty-eight *compositæ*, eight *cruciferæ*, eight *malvaceæ*, and a smaller number of representatives from various other orders. On the coast of Mekran the date-palm is common, but in the interior it is confined to certain lines of country, and the local tradition is that the palms along the lines in the interior of the country sprang up from the stones dropped by Alexander the Great's soldiers on their return from India.* In like manner the ribgrass *(Plantago)* used to be known among the New England Indians as the "Englishman's foot," and in Oregon, *Oxalis Acetosella* (the wood sorrel), which has now spread over all the cultivated districts, used to be known as the "Hudson's Bay weed," the commercial company of that name being credited (?) with its introduction in seed wheat. The nettle is also a constant accompaniment of man in his migrations from Europe over the world.

A mere accident will determine the introduction of a species. The Canada thistle is said to have sprung up in Europe from a seed dropped two hundred years ago from the stuffed skin of a bird. It is now one of the most common weeds.

It must, however, be remembered that man, if he assists in spreading species, also most materially assists in circumscribing the area of others—by changes in the physical geography of a country, or the introduction of species which retard the growth of either the indigenous or other colonial species introduced by him.†

The Struggle for Existence.—This phrase of Mr. Darwin's has got familiarised to an extent that few scientific terms have reached. We have long known that in the thickly populated human communities there is really a struggle for existence, but there is another struggle more ancient, dating from the first appearance of created beings on earth, and which has been raging ever since with a furor more or less keen than that with which unhappily (?) we of the newer creation have been too long acquainted. An appreciation of the nature and extent of this struggle lies at the bottom of a right understanding of the laws which regulate the range and development of species.

Duchartre—an eminent French botanist—has very piquantly remarked that the vegetable world presents the spectacle of a struggle going on at every place, and everywhere at the same time. No sooner does a plant take possession of a vacant spot than it is opposed by another invader; and in the case of social plants, the new arrivals take hold of the district to the ousting of all others—a flora poor in species thus occupying the place which might otherwise have been occupied by a rich one. In the struggle the most vigorous wins. Not only herbaceous, but woody plants, shrubs, and trees, are subjected to the competition for growing room and existence. We are, however, more familiar with it in the case of herbaceous plants. Linnæus calculated that if an annual plant produced two seeds, which shall arrive at perfection (and no plant produces so few), and these in turn perfect each two, and so on in geometrical ratio, at the end of twenty years the descendants from the original plant would be a million of individuals. It is reckoned that a single plant of groundsel *(Senecio)* may produce 6500 seeds, one of chickweed *(Stellaria)* 5000, and one of shepherd's purse *(Capsella)* 4500. Darwin* calculates that a single plant of an orchid—*Cephalanthera grandiflora*—produces 24,000 seeds, and the common *Orchis maculata* the prodigious amount of 186,300; so that, in ordinary geometrical increase (did not the "struggle for existence" intervene) the great grandchildren of a single plant would nearly (in the proportion of 47 to 50) "clothe with one uniform green carpet the entire surface of the land throughout the globe." Yet the orchid in question is by no means widely distributed—the result being that what with overcrowding, the preying of insects, and the mishaps usually looked upon as accidents, very few of this enormous progeny ever reaches maturity. The botanist who thinks over these matters, soon comes to the conclusion of Dean Herbert, that "plants do not grow where they like best, but where other plants will let them"—in other words, "climate and soil have not much influence on the free growth of a plant as the presence or absence of other plants, with which it has to struggle to maintain its place." Mr. Darwin† puts the whole subject admirably in the following passage, in reference to the animal kingdom; but the same, *mutatis mutandis*, might be applied to the vegetable:—"We behold the face of nature bright with gladness: we often see superabundance of food. We do not see, or we forget, that the birds which are idly singing around us mostly live on insects or seeds, and are thus constantly destroying life: or we forget how largely these songsters, or their eggs, or their nestlings, are destroyed by beasts of prey: we do not always bear in mind that, though food may now be superabundant, it is not so at all seasons of each recurring year.‡

In our own country this is apparent. The American water-weed *(Anacharis alsinastrum)* was first recorded in Britain in 1845, though observed a few years sooner. Now it has spread with inconceivable rapidity over the whole land (though, in Britain, it has never yet been known to produce seeds), to the extinction of the native water-weeds with which it comes into contact, yet in America it is not more troublesome than other weeds. The *Ranunculus aquatilis* (water crowfoot) generally disappears in due course when the *Anacharis* introduces itself. Its spread into so many localities is doubtless due to water-fowl. The fringed water-lilly *(Villarsia nymphæoides)*, Mr. Britten tells us, was

* Bartle Frere, *Proc. Roy. Geog. Soc.*, vol. xvi. (1872), p. 22.

† In the Appendix to Pickering's *Races of Man*, a list of the plants introduced into several countries is given.

* *Fertilization of Orchids*, pp. 344-45.

† His great work *(The Origin of Species)* is, of course, the best authority in regard to the questions here discussed. But in the Natural History Department of the *Field* for 1869, Mr. Britten, of the British Museum, has given an excellent *resumé* of the subject with new facts which we have taken advantage of. Dr. Maxwell Masters, with his wonted clearness and ability, has also discussed the subject in the *Popular Science Rev.*, 1873, p. 35.

‡ Pliny appreciated this struggle for existence:—"Necant invicem intersese umbra vel densitate atque alimente rapinâ . . . necat et edera vinciens, nec viscum prodest et cytisus necatur eo quod halimen vocant Græci.—*(Hist. Nat.*, lib. xv., cap. xxiv.)

quickly eliminated from a pond on Wandsworth Common, Surrey, into which it had been introduced, when the *Anarcharis* made its appearance, though previously to all appearance naturalized. The *Potamogeton* seems, however, to be able to keep it in check. In some places this "water thyme," or "drain devil," is really impeding the navigation of canals and rivers—such as at Aylesbury and in the Cam. From M. Duchartre we learn that *Jussieæa grandiflora* thrown into the river Lez, close to Montpellier, from the Botanic Gardens, is now an impediment to the navigation, and that *Aponogetum distachyum*, planted in the same river, is also getting naturalized. In like manner, *Galsinoga parviflora*—a Peruvian plant—is getting naturalized in the neighbourhood of Kew and Richmond. *Veronica Bauxbaumii*, a native of Southern Europe and Central Asia, which first appeared in England in 1820, is now one of our most common corn weeds, and an American balsam *(Impatiens fulva)* is equally at home amongst us. We know that this has been introduced; but in reality plants like the poppies, corncockle, pimpernel, red dead nettle, fumitory, and most of our corn weeds, and even such plants as the chickweed, groundsel, shepherd's-purse, and *Poa annua* are to a great extent dependent on cultivation, and may have originally been introduced, though their origin cannot now be traced. The three last, as Dr. Hooker has well remarked, are closely connected with cultivation. "I do not remember," he says, "ever having seen any of these plants established where the soil was undisturbed, or where, if undisturbed, they had not been obviously brought by man or the lower animals: and yet I have gathered the shepherd's-purse in various parts of Europe, in Syria, in the Himalayas, in Australia, New Zealand and the Falkland Islands." The same eminent botanist and physical geographer directs attention to the fact that, while in uncultivated districts the proportion of annual plants is exceedingly small, in cultivated districts they are numerous; "and, the further we go from cultivation, roads and made ground, the rarer they become; till at last, in the uninhabited islets of the West Coast of Scotland, and in its mountainous glens, annuals are extremely rare, and confined to the immediate neighbourhood of cottages." He continues, "It is usually said of some of the annual plants that they prefer cultivated ground, nitrogenous soil, and so forth, and this is no doubt true; but that they will flourish where no such advantage attend them a very little observation shows; and that they do not continue to flourish elsewhere is due mainly to the fact that, being annuals, their room is taken as soon as they die, and the next year's seedling has no chance of success in the struggle with perennials." About one-fifth of the British plants are supposed to be naturalized species—many of them being dependent on agriculture for their existence. *Rumex acetosella* has been introduced in grain into nearly every colony, and in New Zealand it is spreading with singular activity, and would take possession of the land did not the farmer find that in the struggle for existence it cannot bear up against the greater vigour of the white clover, which soon kills it. This is taking advantage of "natural selection." Even, in one locality at least, the white clover has its match in the cat's-ear *(Hypochæris radicata)*, which has been introduced into New Zealand, where in less than three years excellent pastures have been destroyed by it. In little more than thirty years, at least 180 European weeds have got thoroughly naturalized in New Zealand, and in the Northern United States alone 214 British plants have got introduced from Europe since that country was colonized, and are now settled as if "to the manor born."* In Gray's *Manual of the Flora of the Northern United States* altogether 260 naturalized plants are enumerated, belonging to 162 genera, and of these 162 naturalized genera no less than 100 are not indigenous there. Out of 2091 indigenous flowering plants, there are 321 European species.†

The knot-grass is very common about New York, and the introduction of the *Anacharis* into Britain is paralleled by that of the *Vallisneria* into the Hudson, where, in the months of August and September, it almost stops navigation in many places. The watercress threatens to choke up the New Zealand rivers in the province of Canterbury. These may be taken as salient examples, but instances could be multiplied to almost any extent. Thus a grass *(Stipa textilis)* has invaded the Southern Russian steppes, and is rapidly displacing almost every other plant. Plants introduced into India since it was first visited by Europeans now range from Cape Comorin to the Himalayas, and several plants, such as the cardoon *(Silybrum marmiarum)*, and a tall thistle *(Cynara Cardunculus,)* introduced from Europe, now clothes, almost to the exclusion of other plants, whole leagues of the plains of La Plata and Uruguay. Auguste Saint Hilaire mentions that in Brazil, around Saint Therese, the European violets, borrage, fennel, and some geraniums, are perfectly naturalized. The oat is very common in the pastures, and everywhere throughout the country we find the familiar mallow *Anthemis* and *Marrubium* of Europe. A European *Magyrum* is now completely naturalized on the walls of Monte Video, and occupies the space between the city and suburb. The flora of the American prairies is, as a whole, singularly susceptible to the inroads of civilisation. Even the grazing of cattle for a few years is sufficient to materially alter its character. The grasses dwindle in size and luxuriance, while the relative abundance of the other plants become materially altered. The breaking-up and turning-up of the soil at once exterminates a large number of the previously dominant species, and the more hardy exotics usurp their places, the cereals, the cultivated grasses, and the noxious weeds of the old world thoroughly "crowding out" the original occupants of the soil.‡ Mr. H. Gillman notices that in a pool at Sandwich, on the Detroit River, U.S., *Wolfia Columbiana* (Karsten) has taken possession, driving out the equally tiny *Lemna minor*, before quite abundant.§

Mr. Darwin states that "the facts hitherto observed favour the supposition that in the struggle for life between the denizens of the Old Continent and the New, the former are prepotent," and attributes this to "the longer period they have engaged in the strife, and the consequent vigour they have acquired." At all events these facts show us that plants are not in all cases placed by nature just in those situations which

* Travers, cited by Hooker in *Natural History Review*, 1864, p. 124.

† Gray on Statistics of the Flora of the Northern United States, in *American Journal of Science* 1856, p. 9.

‡ J. A. Allen in *American Naturalist*, vol. iv. (1870), p. 585.

§ *Ibid*, iv., p. 690.

are most advantageous to them—plants attaining more vigour in localities where they have not been settled more than a hundred years than in their original homes. In the clothing of a railway embankment with plants the annuals which at first take possession have soon to yield to the perennials, and disappear after a year or two.

In New Zealand especially do we see this struggle for existence going on between native and introduced plants and animals. The Maoris have even recognised it, and have a proverb that, "As the white man's rat has driven away the native rat, as the European fly drives away our own, and as the clover kills our fern, so will the Maoris disappear before the white man himself." Perhaps the most remarkable instance is the threatened extermination of the New Zealand *Phormium tenax*, a strong fibrous plant, with leaves sometimes ten feet long, by the common white clover. Though when masses of this "flax"—in reality it is one of the lillies, and does not belong to the flax order *(Linaceæ)* at all—are broken up, numbers of other plants appear on the disturbed soil, yet the white clover reigns triumphant over all. The cattle following the clover into the swamps, trample down the flax more and more, and so help its extinction, animal and vegetable thus working in harmony.

The original vegetation of the Cape Colony is being in many places destroyed or rapidly deteriorated by overstocking and by the accidental introduction of various weeds. Among the most important of the latter is *Xanthium spinosum*, introduced from Europe, the achenes (or characteristic fruits) of which cling to the wool with such tenacity that it is almost impossible to detach them, and which render it almost unsaleable. It spreads with such rapidity that in some parts legislative enactments have been passed for its extirpation; and where this is not done it almost usurps the place of the more useful vegetation. Mr. Bentham states that the *Xanthium* has in the same manner deteriorated the pastures in Queensland, whilst in the South of Europe, where it is equally abundant, it does not appear to cause such injurious results. Though generally distributed through Europe, the plant is, probably, of Chilian origin.*

And so it is in all countries, though more especially in those rich in species, and where the soil is more valuable, until we come to the Arctic Regions, where the species, like the natives, do not require to contend with other races, but only with the elements. In all this the student will observe that there is no confusion—no contradiction to the harmony of the Providence of Nature—but only parts of one beautiful law. The wars of the roses may be a perpetual war, but it is a war between well-ordered and well-disciplined foes. When we talk of a plant being "rare" or "common," we in reality condense into these two words a wider world of fact and theory than is dreamt of. In a remarkable passage Darwin shows this; and there is richer food for thought in it than even at first sight appears:—"When we look at the plants and bushes clothing an entangled bank," he writes, "we are apt to attribute their proportional numbers or kinds to what we call 'chance.' But how false a view is this! Everyone has heard that when an American forest is cut down, a very different vegetation springs up; but it has been observed that ancient Indian ruins, in the Southern United States, which must formerly have been cleared of trees, now display the same beautiful diversity and proportion of kinds as in the surrounding virgin forest. What a struggle between the several kinds of trees must here have gone over during long centuries, each annually scattering its seeds by the thousand: what war between insect and insect—between insects, snails, and other animals, with birds and beasts of prey—all striving to increase, and all feeding on each other, or on the trees, their seeds, and seedlings; or on other plants which first clothed the ground, and thus checked the growth of the trees! Throw up a handful of feathers, and all must fall to the ground, according to definite laws; but how simple is this problem where each shall fall, compared with that of the action and reaction of the innumerable plants and animals which have determined, in the course of centuries, the proportional numbers and kinds of trees now growing on the old Indian ruins." Yet the equilibrium of species in the world, or in the same particular locality, is preserved by the number of foes or allies it may have among the animals and plants inhabiting the same region—a question we cannot go into. It would be equally foreign to the nature of this journal to point out what bearing the facts we have enumerated have on certain deeply interesting and important philosophical questions now agitating the scientific world. It is enough to summarize the state of our knowledge, in the hope that our readers, scattered over the world, may add to it.

ROBERT BROWN.

* Shaw, *Journ. Linnean Soc.* (Botany), Vol. xiv., 202.

SIGN-POSTS ON OCEAN'S HIGHWAY.

DUST.

CHAPTER I.

(A Biography by one of the Family.)

"Who hath measured the waters in the hollow of his hand, and meted out the Heaven with a span, and comprehended the dust of the earth in a measure."

How few of those, who tread on us now, imagine that we had a beginning, that there was once a solitary Dust, with no one to think of him, no one for him to think of. Our present condition is so utterly antagonistic to solitude, we are so innumerable, so indestructible, so all pervading, that individuality seems improbable or even impossible. Our little ancestor is in fact a forgotten atom; we, his children, in our vanity and pride of numbers, have ignored what he has done for us; in our turn, we are not only despised and detested by all of our thinking relations, but we have been and are maliciously and systematically libelled by those who not only owe their existence to us, but who gain their living by our assistance. It is with a hope of stopping these long-existing scandals that we venture on this biography. If we are successful we will with pleasure condone with bygones, but at present we only refer to them as far as they are necessary to our tale.

To say that we are an influential family is a mild expression. We occupy every corner of the earth, we are in perpetual circulation, we obey the winds

and the waters, we use both for our travelling equipages; we dive to the bottom of the sea, we fly to the utmost limits of the air, and the earth is full of our riches. All the forms that grow, all that live on the surface of the earth, are partly indebted to us for their positions and their conditions; all in the inanimate and animate worlds are constituents of ours, all have borrowed from us on personal bonds, with promise of repayment at uncertain dates. We recognize in their honesty a bright type of our common ancestor, a type that he has handed down to us from the beginning, a type entrusted to him by our Creator, a type that must continue to our end. Under the influence of this mutual confidence, a natural monopoly has sprung up, our business has increased and multiplied, our premises occupy the earth's area, our strongholds are beneath the surface of soil and water, there we keep our accumulated capital, and interest ready for issue on demand. As the treasury of an empire contains types of all its coined issues, so we keep types of those that have issued from us; as coins have changed with emperors so our issues have changed with epochs. The care and accuracy with which we keep our treasures have very much aided man in preparing his endless index; he can still read coins that were struck 2500 years ago; but time and natural erosion have so obliterated some of ours, that horizons are irregular, and pages have become illegible. As science knows by the metal the æra of an illegible coin, so it is now reading some of our nearly obliterated monograms, with a hope of reading more. The catalogue has grown so long that we cannot stop to examine it critically; we shall use it as we require it, without lingering over the pleasant scenery by the way, as so many have done; but in examining our treasury we shall be guided by one great rule—the dust of yesterday is covered by the dust of to-day, by adhering to the context we hope to trace back the history of our great forefather. As coins circulate under the capricious and artificial laws of commerce, so we circulate under the fluctuating actions of the laws of nature. Every atom that we lend is converted into something else by the borrower, every loan repaid to us comes back in a character different to our issue. Some of our customers are very minute; as small coins circulate through many hands without much consideration, so our small constituents pass through many organisms; in every instance they are altered from what they were. Thus the invisible herb and the largest tree, the microscopical insect and the *Monstrum horrendum* have their separate and distinct uses for us dusts. We know that creatures and vegetations are innumerable, no two of them are alike in their mechanism, their chemistry, or appearance; types are for ever multiplying; as they do so, we benefit by the increase, and thus, as Professor Tyndall expressed it in his oration to the British Association at Belfast, "varieties are continually produced."

Under this still beginning, never-ending system, such great changes have taken place in the character and appearance of dusts, and our creations, that a growing confusion has crept into those histories or details of our family, which man, from the time of Solomon, has so often presented to his fellow creatures. Perhaps few of those who have done so have felt their own smallness so acutely as we do, yet we accept the same temptation as they did, and sit down with a hope of correcting some sign-posts, as well as of erecting another, which, with the aid of our delicate clue, may assist some future traveller to the long sought goal.

We have rested on the highways and byeways, on plains, on valleys, and on mountains—we have drank of the brooks, the rivers, the lakes, and the seas—we have dwelt in the mists, the dews, the rain, the hail, and the snow—we have known the calm, the breeze, the storm, and the hurricane—we have heard the thunder, and embraced the lightning—we have basked in sunshine, and shivered in the frost—we have been changed and broken up under the forces of all. Yet, as Tyndall expresses it, "however small the parts, each carries with it the polarity of the whole," every atom retains its use, and its principle We think that we have a clue to guide our trembling footsteps. We warn those who attempt to take it up, that it is weaker than a rope of sand, that it will not bear the grasp of a drowning swimmer, or sustain a stumbling runner; we ask the patient, in a spirit of affection, to take up the clue, and follow on.

The Bible, on which we love to rest because the chances of disturbance are so often few, tells us that our Creator occupied two days of His time in preparing the elements to make dry land; on His third day the dry land appeared; from that moment there was dust—a glittering finger-post on ocean's vast highway. From the present moment, back to the nursery of legendary lore, man has been puzzling his brains as to what came next. We have a good deal to say about the infancy of our ancestors but, to enable those who follow the clue to comprehend its meaning, it will be well to clear off a few cosmical mists which the caprice of man, for his varied purposes, has gathered around us. Perhaps there is nothing more wonderful in nature than the reasoning faculty of man. He may not have been created with it: it is even said of him at this present moment that he only varies from cattle by the lack of horns and tail; but he has, said the Lord God, "become as one of us to know good and evil." If we accept this dogma, we must also accept "Dust thou art and unto dust shalt thou return." In allowing that, we admit that the cosmical dust is the casket of our reason, and, as such, that it must be under the control of the Creator. Cosmogony and reason have been united so long and so intimately; the great religious doctrines of the world have been and are so closely connected with us for good and for evil, that we are not prepared to get rid at once of all the gods and demons denounced by Professor Tyndall in the oration referred to, as published in *The Hour* of the 20th of August 1874:—"Science," he said, "demands the radical extirpation of caprice"; on which we remark that true science has no caprice, but common sense demands the extirpation of caprice, when introduced to the world under the wings of science. Tyndall told his audience that the philosophies of Plato and Aristotle were "noised and celebrated in the schools amid the din and pomp of professors." Curiously he treated Darwin in the same way at Belfast, on the same cosmical subject. Ancient philosophers "felt that to construct the universe in idea, it was necessary to have some notion of its constituent parts"—those parts which the wise Lucretius called "the first beginnings." It does not appear that the science of the present has made more progress

towards this point than was made by Euripides or Democritus; but it will appear by-and-bye that much progress has lately been made in building cosmical structures without any notion of first beginnings, literally without foundations. As long as the Professor alludes to such scientific structures, religion and common sense reject him—they do not understand his meaning when he says, "all religious theories, schemes, and systems, which embrace notions of cosmogony, or which otherwise reach into its domain, must, in so far as they do this, submit to the control of science, and relinquish all thought of controlling it." As long as the casket of reason is formed of cosmical dust, so long will cosmical science and religion be united: at present there may be caprice in both. Religion has not shown its caprice, Professor Tyndall has done so; he delights to honour Darwin in the national assembly of professors, in his search after "the origin of species." "With profound analytic and synthetic skill (Darwin) investigates the cell-making instinct of the bee-hive;" he "associated himself with pigeon-fanciers," and in reply to the question, "Can nature select"? he replied, "Assuredly she can"! The Professor tells his audience, amidst applause, that Mr. Darwin "shirks no difficulty," but not feeling sure that his own belief was sufficient evidence of Darwin's science, he brought in the glacial visionary, the late Professor Agassiz, amidst elegant oratory, as a witness to the point—"I confess that I was not prepared to see this theory received as it has been by the best intellect of the time; his success is greater than I thought possible." Professor Agassiz avoided expressing his own belief, and the words he used may have intended a very common proverb. Some years ago we rested pleasantly on Darwin's ideas: we were disappointed in them, as Tyndall seems to have been, for, said he, after gradually diminishing the number of progenitors, Darwin "comes at length to one primordial form." The Professor naturally asks "How came the form there"? His answer destroys the pedestal he had set up—"The anthropomorphism which it seemed the object of Darwin to set aside, is as firmly associated with the creation of a few forms as with the creation of a multitude." "Let us," he continues, "open our doors freely to the conception of creative acts, or, abandoning them, let us radically change our notions of matter." We will await a postulate before changing our notions. But Tyndall uses the word "grotesque" in reference to religion—past, present, and future. We shall see presently that what he calls grotesque was applicable to the condition of the times, while it is easy to reverse the sentence which he has uttered, and say the caprice of theories may be mischievous "if permitted to intrude on the region" of religion. In the midst of philosophic ideas Tyndall involuntarily returns to cosmical nature: "All we see around us, and all we feel within us—the phenomena of physical nature, as well as those of the human mind, have their unsearchable roots in a cosmical life" . . . . "inscrutable to the intellect of man." Into this his "science claims an unrestricted right of search." No one hinders him. Virgil, Dante, Milton, flew up to Paradise, and went down to Hell. The world has been instructed by their philosophic poesy, and the deeper science dives into the dust of cosmos, the more instructive, the more religious will it become; the more we search the more we find; for points, supposed to be concluded, are not even dreamed of in man's philosophy. Has not Professor Tyndall, in his ardour to reach the mountain peak, mistaken forms of religion for the thing itself—that great emotion of the human mind, that sees "a God in clouds, and hears Him in the wind;" and while finding fault with forms* for fettering his fancy, he glides down the snowy slope, and does not show how science is affected. May we express a regret for the omission, and commission? Concluding this subject, by quoting from a weekly paper, *Punch*, 29th of August 1874—

"But, even as Milton's Demons, problem tossed,
When they had set their Maker at defiance,
Still 'found no end, in wandering mazes lost,'
So is it with our modern men of science."

Looking back on parts of the outlines of ancient religious cosmogonies, we cannot help seeing that the systems were fabricated by man, to work on the emotions of his fellow-creatures. Grotesque though these systems may now appear, we cannot but allow that they were adapted to the times in which they originated, and that they are still suitable to those amongst whom they found a beginning. There was one supreme God, with his numerous avaters; there were demons in plenty for the followers of Brahma; there were perpetual destructions and reconstructions of worlds, good for the good, bad for the bad; there were oceans of sugar-juice, of spirits, of ghee, and of water, and the ambition of all was led up to a glittering circle of pure gold, encircling the earth as a tire encircles a wheel.

Buddah varied a little in his cosmogony: he had three worlds, three heavens, and three hells. The wants of life were satisfied by circles of land, of honey, and of water, while from the midst of these arose his mountain, "40,000 miles in height"—H. Miller. Are there not parallel passages in our own scriptures?—

"The hill of Sion is a fair place, and the joy of the whole earth." "He hath made the round world so sure, that it cannot be moved." "A land flowing with milk and honey." "The Earth is full of Thy riches."

Since these oriental days of good intentions we have seen a conclave of priests ignoring the Revelations of the Bible, punishing science, and rejecting the geographical wisdom of Columbus. Passing on to Hugh Miller, we find him saying in his "Testimony of the Rocks," that God did not reveal "the great truths, physical in their bearing," but left them to be developed "by the unassisted human faculties." We put down these unassisted among those who still carry the tails and horns, for every one who can think is assisted by his God.

When we come to separate cosmogony from religion, and to look upon it as a mere physical science, we shall see where present geological teachings lead us to, in reference to the point that we desire to elucidate. Mr. Henry Woodward, F.R.S., &c., has put together so many authorities, touching on our birthplace, that we take up his *Geological Magazine* to illustrate our introduction. In No. 114 we find—"Finite as is our individual existence we are privileged in forming part of a race . . . . which . . . . has achieved the power to grasp the most hidden secrets of nature; to investigate its laws, to decipher its monuments, and to evolve our planet's history

* Since this was written Professor Tyndall has explained that he only alluded to forms.

from the chaos of the past." "These grand results have all been accomplished by finite means; each year our knowledge grows broader and higher, like some mighty atoll in the Pacific, not by vast accessions, but by the accumulated labours of individuals."

There are two points in this history connected with us dusts, which we must examine for the purpose of seeing if the secret of our birthplace has been correctly evolved; we must recollect that we claim it on the first dry land. Some of the present highlands of the earth may have been in that condition, and the question of their formation "has of late occupied many of our ablest and most profound physical geologists." It seems to be generally assumed, "that all the phenomena of corrugation of the earth's surface . . . are to be regarded as effects of one and the same cause, differing only in magnitude." The cause is in "a fluid interior;" so that "we are justified" in considering this earth "as cooling by radiation." Under this system rocks are supposed to contract, and "thus through the unequal contraction of the earth's crust," "the first preliminary stage necessary for the commencement of mountain formation would be accomplished."

After these minor corrugations were formed, "sedimentary deposits on the largest possible scale, resulting from meteoric action over the newly made continents, would begin to accumulate." We are not told what these sediments were formed of, but we shall come to meteoric action presently. Professor James Hall is quoted to show that some "mountain chains are composed of enormous masses, of sediment . . . even 40,000 feet in thickness." As the contracting cause had lost its power by its corrugating effort, and as only little wrinkles were formed, it was now necessary to show how these vast masses, accumulated as sediments under water, were "elevated." As the weight of these accumulations was also considerable, Mr. Woodward naturally asks, "Why does the yielding to horizontal pressure take place along these lines of deposit in preference to any other?" The answer is so ingenious, so philosophic, that we shall have to repeat it occasionally in our details. It had been shown by several illustrious geologists, that the accumulation of sediment "necessarily produces a rise of the geo-isotherms, and an invasion of the sediments by the interior heat of the earth;" but it will be recollected that just on this spot, this imaginary heat had already done its duty; the place had got cold, the rocks had contracted, they had formed wrinkles; 40,000 feet of sedimentary matter had settled upon them, and then the whole was lifted up by a new accession of heat from an unknown source. If science could apply this system to its boilers, they would steam round the world with one good heating. As soon as that cooled, a little hot water picked up at boiling stations would renew the boiler isotherms, and the service would go on merrily. We reserve serious notice of this comical theory till we reach our details; at present we can only remark that under the ordinary deposit of matter, not meteorites, there are soft deposits and hard deposits. When, under the current laws of nature, these deposits fall under the denuding forces, the hard deposits remain, while the soft are worn away, so that we cannot accept a birthplace for our forefather on the imaginary corrugations, or on the greater elevation produced by sedimentary deposits, when raised by the patent lift.

As to the profound physical geologists alluded to by Mr. Woodward, we are sorry to find that no two of them agree as to the manner of the formation of our birthplace, or as to the system in use by the forces employed on that formation; in fact, they cannot say where the one cause alluded to by Mr. Woodward is to be found. We shall show in the course of our Biography that this theory has for many years upset and distracted the minds of inquirers as to "the beginnings," and has induced many to raise great fabrics without foundations. At present we close this part of the subject by saying—

> "No constant furnace burns in realms below,
> No molten rocks in constant currents flow;
> But we small dusts contain a heating cause,
> By sunbeams lent us under nature's laws."

In raising his atoll Mr. Henry Woodward has alluded to meteoric action. We have said that our duty is to pass through all the creations of this earth; we said that all these creations repaid their debts, and we have just hinted how we dusts repay some of our debts to the sun; but Mr. Woodward introduces us to foreign matter. We must be careful how we meddle with it, how we allow it to mingle with our circulations now, or how far we may be indebted to meteoric action as giving our ancestor his birthplace. "When," says Woodward (*Geological Magazine* 114, p. 539), "the great continental areas were originally elevated as vast anticlinals above the general ocean," then "sedimentary deposits . . . . . resulting from meteoric action . . . would accumulate in the great submarine synclinals parallel to the coast." At the present moment these slopes parallel to coasts are the arenas where the last process takes place in triturating silicious rocks: they are rolled to and fro, they are battered against one another, the whole of their earthy matter is washed out of them, and carried on in solution, while the refined silicious sand forms the sea bottom of the slope, or is thrown up in glittering atoms on the shore. The earthy solutions are carried on and on, till the waters, finding a resting-place, leave them as sedimentary deposits on the flat, not the sloping, bottoms. The great sedimentary deposits of the ocean do not settle down on the submarine synclinals any more than the lees settle down on the sides of the wine cask.

Whatever meaning Mr. Woodward may apply to meteoric, no meteoric action could place the sediments where he wishes; but he touches on a subject which is highly interesting to us dusts, as leaving us to speculate on a higher birthplace than we thought of, and very materially increasing our circulation. As no precise meaning is given to it, we associate the word meteoric with—"No class of rocks offers such varied and marvellous attraction for the speculative and theoretical geologist as do those remarkable bodies called meteorites." There are few things, however simple in themselves, that cannot be converted into sensational subjects. We dusts ought to dance with excitement, when we are told that "many of these have come to us as entire asteroids from stellar space, through which, small as they are, they held their independent courses, and only succumbed (as our planet may, in its turn, be obliged some day to do) to the superior attraction of a larger orb than its own. "These meteorites" have been found in nearly every

quarter of the earth's surface, "they are known to fall at all times, over land and over sea," so that "their actual number in each year must in reality be very considerable." The chemistry of these meteorites "teaches us that they yield only those elements which we know to exist on earth, and therefore we may justly conclude that the most distant regions in stellar space contain only a repetition, in varying proportions and combinations of the same elementary substances." Mr. Woodward congratulates his audience on the erection of this part of the atoll, and tells them that "this discovery of the continuity of matter throughout the universe may justly be looked upon as among the greatest results of intellectual effort, and one of the grandest generalisations of modern science." All this has been done by finite means; these are some of the secrets of nature, which man thinks he has grasped. The spheres, the worlds in stellar space, cast their fragments away; some of these atoms fall upon the earth; they renew the oriental teachings in an abstract way; worlds are destroyed and reconstructed; they are made simple cosmical phenomena now, while Brahma wisely used them for the religious and moral emotions of his time.

Utterly despised as we dusts are, we content ourselves with saying here that Mr. Woodward has no proof that the meteorites which fall on earth were ever part or portion of a sphere in stellar space; he cannot prove that any "atoms or systems into ruin hurled," ever scattered their fragments into stellar space; the poet may sing, "Now a bubble burst, and now a world," but science, as the filter of caprice, cannot do so. Mr. Woodward cannot prove that any meteorite, which has at any time fallen on this earth was, as a whole or in the shape of atoms, at any time beyond the atmosphere of this earth; so that there is no discovery of continuity of universal matter.

As far as we are concerned, nothing troubles us more than any alteration of our cosmical duties. Idle though some of us may be we are all bound to obey the laws. We are composed at present of all that was once beautiful and attractive, ugly, and unattractive; we have the poisons of growths, the odours of lives, the sweets, the acids, and the bitters; we contain all the colours of the rainbow; we are tough, tender, hard, brittle, and elastic, adhesive and non-adhesive; every quality found in any one of our types is partly due to us. We are amenable to the forces of air and water; we descend to the bottom of one, and ascend to the top of the other; our relations with these two elements are so admirable, so godlike, that man has not as yet comprehended them. As we mix with the air we give back to it the loans of the organisms that returned them for a time to our treasury. In consequence of these repayments the air retains its balance of power. When we have left our gaseous trusts behind us to mix again with the breath of heaven, to enter into more creations, we retire again to the earth; we retain our atomic polarity, as so beautifully illustrated by Professor Tyndall, on the occasion above referred to. Is it strange that, under the influence of this power, we should unite and concrete as our gases leave us, and then, as having done our duty, is it strange that we should return to the earth in showers of light and gladness? Is it wonderful that man's finite powers have not yet evolved this planetary system? He may glean some of its wondrous beauty by a system that he does know of. In descending to the bottom of the water we retain our gases, our minerals, metals, and our sunbeams; as we give them out again, the colours are used in growths and lives, our metals, minerals, and our gases are used for the same creative purposes, while man uses them to renovate feeble creations, and we remain there in the waters for the benefit of those that dwell therein. So long as this earth continues poised in air, and surrounded by water, this interchange of duties must take place. There are three incomprehensibles forming a unity, a wondrous world, a godlike Trinity, each dependent on the other, and in their innumerable actions they have not as yet been deciphered by man.

There is one more point connected with this supposed discovery that must not be here passed over. The chemical materials of meteorites are the same as the materials which are found on earth. As none of these materials which are found here could have existed as they are without earth, water, and air, it would be necessary for any sphere in stellar space, from which these meteorites came, to have the same trinity; but it is commonly asserted that the heavenly orbs have no atmosphere, and that they have varied densities. We rather think that similarity of systems must be proved before we can claim our origin from stellar space. If this similarity can be proved, there are fixed laws of attraction and gravitation, which, in our humble opinion, would be very antagonistic to any sensational arrivals on this earth from stellar space, and equally so to any departures from us to those regions.

In the course of our biography we shall have to touch on these points again; we cannot now rest on this mythical atoll as a birthplace for us. We foresee dark whirlwinds, and smothering dust storms, but we can follow the example of the wandering Bedouin, and while he repeats his prayers to the sand, we can whisper to our relations:—

"No chance ejection from another world,
No careless dusts on stellar space unfurled,
No new attraction for a falling star,
No finite thoughts our infinite to mar."

In other words, we cannot accept a birthplace for our great ancestor from stellar space, from igneous causes, or from any source independent of man's cosmical emotion to a Creator. We are bound up in the last, we are the cause of the second, and the first is not proved. Those, who try to throw dust in the eyes of others, may chance to have it returned; those who build fabrics without foundations, may chance to see them fall; and those who trust to finite thoughts, can never get beyond them.

The Dust of this earth is not as yet comprehended, its atmosphere is not understood, and its waters are not measured. We go on, trusting to our delicate clue, with a hope of measuring, understanding, and comprehending the birthplace and some of the results of the Birth of Dust. We will endeavour to build on sure foundations, never to be independent of a great "First Cause;" and as long as we are true to that, we cannot be opposed to science in its truth.

(To be continued.)

H. P. MALET.

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IRRIGATION IN SOUTHERN INDIA.

THE PERIYÂR PROJECT.*

IRRIGATION is one of the most important questions which can occupy the attention of administrators in India. It is so, whether we consider the unsatisfactory state of repair of works of native origin in various parts of the country, their capabilities for improvement and extension, or the numerous great projects for providing water for hitherto unirrigated regions: whether we look upon it as a means of enriching and benefiting the inhabitants or as a source of increased revenue to the State.

The knowledge that the water, flowing through deep channels to the sea, would, if brought to the surface of the land, convert parched deserts into fertile gardens, has led to efforts being made to raise the life-sustaining element by various contrivances from the earliest times. Some districts trust to supplies from wells, others to tanks for catching and storing the water, wherever the formation of the land is suitable. Some extensive regions depend on the inundations of great rivers; while, especially in modern times, many vast areas are made fertile by the construction of dams at the gorges where rivers enter the plains, or where deltas commence. Through the delta systems in the Madras Presidency, with which the name of Sir Arthur Cotton is for ever associated, 1,352,360 acres of land are irrigated; and if the irrigation from tanks is added, the total area of irrigated land in the Madras Presidency is 3,124,480 acres.

But this is wretchedly insufficient for the wants of the people. Wide districts in Balari, in Madura, and other provinces, still vainly long for moisture; while enormous volumes of water roll uselessly to the sea; and, in some instances, flow through regions which are sufficiently supplied by the rainfall. It is the duty of the Government, aided by engineering science, to do all that human skill can achieve in the construction of works which will prevent this waste; and so convert tracts which are now arid wastes into cultivated fields and gardens.

The southern part of the peninsula of India is peculiarly circumstanced with respect to its water supply. This region is in the shape of a triangle, with its base formed by the rivers Ponani and Kaveri, and the Palghat gap, its apex at Cape Comorin, and its sides following the coast lines. It is divided into unequal parts by the mountain system which includes the Anamalli, Palani, and Travankur Hills, and terminates near Cape Comorin; and a glance at the accompanying hypsographical sketch map will show the positions of the native states of Travankur and Cochin on the west side of the mountains, and of the wider plains of Madura and Tinnevelli to the east. On the western coast, which receives the full force of the S.W. monsoon, the rainfall, as shown on the small rain map, is over 100 inches in the year; while on the eastern side of the peninsula it is only 25 to 50 inches. This difference necessarily produces a very remarkable difference between the two regions, which may be seen at one glance, from some commanding positions on the intervening hills. A spectator standing on the lofty peak of Aghastya-malli, where until recently there was an observatory, and facing Cape Comorin, will see, on his right hand, an expanse of country bounded by the sea, and covered with the richest vegetation; while on his left hand he will behold a parched and arid plain, dotted with tanks, sustaining patches of cultivation here and there. Yet, on this very east coast, a little further to the north, there is, in Tanjore, one of the richest and most fertile districts in India, formed entirely from the irrigation supplied by the Kaveri. This river derives its waters from the mountains of the western ghâts which receive the rains from the S.W. monsoon. To the south of the Kaveri it will be seen that there is no river with such distant sources, but that all the streams, in Madura and Tinnevelli, derive their scanty supplies of water from the dry faces of the hills overhanging the eastern plain. But a further examination of the map will show a great river, much smaller than the Kaveri it is true, but still of considerable size, which rises in the central part of the hill system and, after flowing for some distance in a mountain valley, finally turns to the west, away from the thirsty eastern plain, and falls into the Cochin backwater, where its waters are not wanted. This is the river Periyâr. The great problem, for the welfare of the people of Madura, to the east, is how to turn the waters of the Periyâr so that they may flow towards the Bay of Bengal, spreading blessings and fertility on their way, instead of into the Arabian Sea, where they are wasted. This is a project which is well worthy of more attention than it has hitherto received. Madura is a district covering 8789 square miles, being 75 miles long and 125 broad; and the population approaches 2,000,000, so that the importance of the undertaking is evident. The food of the great mass of the people is a very moderate amount of *ragi* porridge, with salt and *chatni*. Even this is precarious, and their very existence depends on the uncertain rainfall, while it is within the power of their rulers, by turning the waters of the Periyâr, to remove this uncertainty. At present the Madura district contains 5688 tanks (the larger ones may be seen dotted over the map), besides 508 river channels, 376 *anicuts* or dams, and 21,963 wells. Assuredly the people themselves have done all that was possible, with their limited means, to obtain water, and to prevent it from being wasted; but the supply is utterly insufficient, and the wells and tanks often dry up, especially on the sea coast, in the district of Râmnâd.

The water supply of Madura is mainly derived from three streams, and their scanty tributaries, which flow from the Varshanâd, Kambam, and Bôdi-Nâyakhanûr valleys, and unite near Allinagaram, to form the river Vaigai. These streams have their sources in the mountains overhanging the valleys, and immediately above them, so that their volume is little increased by the S.W. monsoon, and the Vaigai, as it flows by the city of Madura into the Râmnâd district, is never able to meet the wants of the people. The Kambam Valley is watered by the river Suruli, the main tributary of the Vaigai, the waters of which have been diverted for purposes of irrigation, from time immemorial. Its smaller tributaries rise on the eastern face of the mountains, one of them falling over a precipice, 800 feet high, and unite near Gûdalûr, at the southern end of the valley. Half a mile from their confluence there is the first *anicut*, or dam, across

* The orthography of the official Manual of Madura has been followed in this article, as most accurate. The spelling on the map, in some cases, is according to the orthography of the Indian Atlas sheets.

the Suruli, whence a canal, on the left bank, irrigates rice lands for 5½ miles, and eventually falls into the Kambam tank. From its source to its confluence with the Vaigai the Suruli is 36 miles long, and altogether there are ten *anicuts* across it, with a system of canals and tanks, all within a space of 26 miles. The Kambam Valley, in its lower part, thus has a narrow strip of irrigated paddy land near either bank of the Suruli, while *ragi* and *tûr* crops are raised on the higher slopes, and herds of cattle find pasturage in the upper part of the valley.

Such is the system of irrigation on the principal feeder of the Vaigai. There are two masonry *anicuts* across that river itself, which are said to have been built by two dancing girls, favourites of one of the Naik kings of Madura. They are called *Perani* and *Chit-ani*, and are 22 and 18 miles above the city of Madura respectively. The channels connected with them are sadly in want of repair and reconstruction. Below the *Chit-ani* there is no dam across the river, the land having a considerable slope, and the channels being led off without the aid of an *anicut*. But the supply of water is insufficient, and in some recent years the river has been quite dry 24 miles below the city of Madura. Râmnâd looks in vain for water to irrigate its fields, and a vast region which might be one sheet of rice is now an arid waste. The whole of the above irrigation works are of native construction, and we have not even had the wisdom to keep them in ordinary repair.

Yet beyond the peaks and ridges that are visible from the plain of Madura there is the remedy for all this scarcity. It had, indeed, been observed by the natives of the country, for many generations, that while a scanty and insufficient supply of water came to them, a volume, which is out of all proportion to the possible wants of the western coast, runs to waste in the Cochin backwater. The people know that a great river flows within a few miles of the crest of those mural precipices whence the streams which form the Vaigai descend, but on the wrong side. The idea of cutting a canal so as to turn the waters of this river over into the eastern plain naturally suggested itself, and hence the Periyâr scheme is nearly a century old.

The great river alluded to is the Periyâr. The exact position of its source is unknown, for it rises in the unexplored mountainous region which is represented by the large blank on sheets 62 and 63 of the Indian Atlas. This blank probably consists of a mass of mountains, with peaks 6000 feet high, covered with dense primeval forests. It is about 30 miles long, by 20 broad. Where the Periyâr issues from the unknown country it is already a large river, and after a course of 8 miles in a N.W. direction, it is joined by two important streams called the Periyâr-Maliyâr and Yerl-yettu-Maliyâr (see *Map of the Upper Periyâr*). The latter is so called from the circumstance that the track crosses it *yerl* (seven) or *yettu* (eight) times. It rises in the mountains which bound the Kambam Valley on the south, and joins the Periyâr-Maliyâr, the united streams falling into the Periyâr. The Yerl-yettu-Maliyâr is joined by a rapid little stream, with a course of about 4½ miles, parallel to the mountain ridge, called Chinna-Maliyâr which means literally "small hill stream." It drains an area of about 18 square miles.

These details, which are all shown on the map, are necessary in order to make the scheme for fertilizing Madura intelligible. The country which will be the scene of future engineering operations is covered with dense forest, alternating with bamboo jungle and elephant-grass 12 feet high. At certain seasons it is excessively feverish, and abounds in wild elephants, leeches, and tigers. It is about 3000 feet above the sea, the crest of the mountains being 3200 feet and the Kambam Valley below, at its upper end, about 1500 feet above the sea. The village of Periakolam, at the lower end of the valley, is 1008 feet above the sea. After the union with the Periyâr-Maliyâr, the river Periyâr is 20 yards wide, and shapes a course among the hills, in a westerly direction, for 11 miles. It then turns north, and flows between hills covered with bamboo jungle, in a rocky bed, with a depth of 4 feet in the shallows. The discharge in December is about 80,000 cubic feet per hour, and the width of the stream varies, during the year, from 30 to 70 yards. Flowing onwards to the north for 90 miles, over a high rugged table-land, overgrown in places with an impenetrable forest, and receiving several tributaries, it finally passes Alwye, the famous bathing-place in old Portuguese and Dutch times, and empties itself into the Cochin backwater. Its whole course, exclusive of windings, is 150 miles. The lower portion is used for floating down timber, both by the Cochin and Travankur Sirkars; but when we consider that it receives hundreds of perennial streams, and several large rivers below the confluence of the Periyâr-Maliyâr, it cannot be asserted that its lower course would be injured for purposes of floating timber by the proposed dam. Meanwhile, so far as irrigation is concerned, the whole volume of the Periyâr waters now runs to waste.

The last served usually gets the smallest share, and the Zamindâri of Râmnâd forms no exception. This district is situated on the lower part of the course of the Vaigai, which does not enter it until it has supplied Madura with water. Hence Râmnâd has suffered loss and calamity for centuries, because the surplus water of the Vaigai does not reach more than half through the district, and frequently no surplus water reaches Râmnâd at all. The people of Râmnâd, therefore, have a special interest in the Periyâr project. Efforts of which we have no record had been made in earlier times; and in 1798 Mutu-Askula-Allay, the energetic Pradâni or Minister of Râmnâd, whose name is still remembered by the people, determined to renew them. For this purpose he sent some intelligent natives to examine the practicability of opening a channel, for turning the Periyâr into the Kambam Valley. They reported that the construction of a dam would secure an abundant supply of water to all the districts through which the Vaigai flows, and the project continued to be eagerly discussed, until two years afterwards the idea was taken up by the then Collector of Madura.*

* Mr. J. H. Nelson, the author of *The Madura Country*, a manual compiled by order of the Madras Government (Madras, 1868), throws doubt upon the above tradition of the Periyâr project having been taken up by a Râmnâd Pradâni. My authority is Ward's manuscript Survey Report, which, Mr. Nelson suggests, may be mistaken. He says—"I cannot help thinking that Mr. Markham accepted, a trifle too readily, an unsubstantial myth" (Part V., p. 55). At the same time Mr. Nelson tells us that the correspondence touching the cession of

In June 1807, Mr. Parish, the Collector of Madura, undertook an expedition up the Kambam Valley, and over the mountains, to investigate the great irrigation scheme of which the natives talked so much, and the idea of which had been handed down from father to son. He was the first European who ever ventured into this wild region, and he nearly sacrificed his life in the undertaking, being attacked by jungle fever. He, however, requested the district engineer, Captain (afterwards Sir J. L.) Caldwell, to complete the investigation, and it was owing to the perverse report of this officer that the project was shelved for upwards of thirty years. His survey was so incomplete that it seems extraordinary how any opinion, either for or against, can have been founded on it. In 1808 he went up as far as the confluence of the Periyâr and Periyâr-Maliyâr, by following the course of the Yerl-yettu-Maliyâr, which he declared to be so abrupt, that "any attempt at the counteraction of nature's works by human efforts could only excite astonishment and ridicule in a mind possessing but a very ordinary share of judgment and discernment." Having come to this conclusion before he had taken a single observation, and upon simple inspection, he commenced a series of levels from the bed of the Periyâr; but before he had proceeded 400 yards he declared himself justified in condemning the project as "decidedly chimerical and unworthy of any regard. The country," he adds, "is in the heart of mountains remote from any habitation, infested with numerous wild beasts, and to an extreme degree insalubrious." It may be that the latter circumstances had something to do with Captain Caldwell's hasty condemnation of the scheme, on utterly insufficient data.

The unfortunate report of this officer had the effect of discouraging those who were anxious to see the great work accomplished. The project was cast on one side for many years; and, as the quaint writer of the manuscript survey memoir of 1816 says:—"Caldwell's report disconcerted the laudable intentions for benefiting the countries dependent on the Vaigai."

The Periyâr project was not heard of again until 1837, when Colonel Faber brought forward a plan in connection with some old works. This scheme, however, was on a very small scale, and was only intended to water the Kambam Valley. The work was actually commenced, and there are heaps of rubble and limestone still lying on the spot where it was intended to throw an *anicut* across the little Chinna-Maliyâr, and to make a cutting through the adjacent hill. The crest of the hill was also cut through for a depth of about 20 feet, and a channel was excavated about half a mile long and 40 feet wide. The works were abandoned owing to the breaking out of a fever.*

Colonel Ryves has the credit of being the first officer to revive the Periyâr project in its integrity, after the wet blanket that was thrown over it by Sir J. L. Caldwell. Colonel Ryves first penetrated into this wild country in 1861, when he lost his way in the dense jungle and long grass, and was nearly starved. In the following year he made a very careful examination of the locality between the 19th and 23rd of April, and came to the conclusion that the project was feasible, and that it would be very remunerative. At the point where the Periyâr-Maliyâr joins the Periyâr, Colonel Ryves found that the latter river flows in a deep bed through a narrow valley, between steep hills. Here he proposed to raise earthen bunds with wing walls on each side of the river, and to fill up the bed with a rough stone dam about 60 feet in height. Its effect would be to form an immense lake or reservoir, and at the same time to force back the Periyâr-Maliyâr and Yerl-yettu-Maliyâr, so as to oblige them to be natural channels for the new course of the water. The crest of the gorge separating the Kambam Valley from that of the Periyâr was found, by careful barometrical observations, both of Colonel Ryves and Mr. Barton, to be 190 feet above the bed of the river at the point where the dam is to be constructed, and the distance in a straight line from the dam to the nearest contour line level with it on the Kambam side is 4½ miles. The cutting would thus be about 140 feet in depth, and a quarter of a mile long, through solid rock. Colonel Ryves calculated the cost of the works at 6½ to 7 lakhs of rupees; but, on the other hand, the water will be worth 3 lakhs a year in direct revenue, besides the indirect returns resulting from the increased prosperity of the people. The quantity of water rendered available by the works will be 120,000 cubic yards per hour, from June to December, except for two or three weeks in October, 50,000 from January to March, and in April and May there will be a good flow from local streams.

In April 1865, Mr. Barton, the engineer to the Travankur Sirkar, visited the site of the proposed works, and pronounced them to be practicable. Mr. Levinge, then Collector of Madura, accompanied by Captain Payne, the executive engineer, visited the proposed site of the dam across the Periyâr in May 1864, but the whole party was attacked by fever. In July 1865, Captain Payne again penetrated to the Periyâr, where he found the leeches so abundant, and the grass of such extraordinary height, that surveying was almost impossible. But in 1866 he again, during some weeks, surveyed and measured the ground.

Captain Payne, in his report dated January 1867, stated that the height of the crest of the hills is 170 feet above the deepest part of the bed of the Periyâr. He recommended that the river should be entirely dammed up with a strong bund of stone and earth, about 150 feet in maximum height; the high flood-waters being turned over an escape weir. The waters of the lake, thus formed, would be diverted by a cutting of about 40 feet through the crest. The expense was estimated by Captain Payne at 150,000*l.* (15 lakhs); but it was considered that further investigation would be necessary before a final estimate could be framed. Captain Payne consequently prepared and submitted a final report on August 7th, 1867. The proposed works are a high earthen dam across the Periyâr Valley, and a cutting through the water-shed. The Periyâr waters will yield a supply sufficient for the growth of 149,000 acres of rice in addition to the amount already grown, in two crops. The final estimate is Rs.17,49,000, the yearly cost of maintenance Rs.50,000, and the net profit in the shape of increased land revenue Rs.5,00,000 a year, being 23¾ per cent. on the gross outlay. The plan was submitted to the Government, but it has not yet been matured.

Kâmbâm and Gûdalûr to the British Government seems to point to a previous utilization of the Periyâr waters by landholders of the Kâmbâm Valley.

* See *Reports of the Madras Engineers*, vol. i., p. 23.

When the Periyâr project is commenced it will be necessary to render the immediate neighbourhood of the site less unhealthy, by destroying the bamboo jungle and long grass, making extensive clearings, and erecting comfortable lines for the coolies. The next step will be the completion of a good bullock track; and a Chinchona plantation ought to be established near the works, where the climate is suitable. In so notorious a fever district it will be difficult to procure coolie labour; but this obstacle will be removed by its becoming known that a few hundred trees yielding the fever-dispelling bark are planted within reach, and that supplies of the febrifuge will be abundant.

The Periyâr project will be a difficult and costly undertaking, but it is undoubtedly a most important work. By its means prosperity will be ensured to a large population, an extensive region will be fertilized, and the revenue will be sensibly increased. It will change the district of Madura into a second Tanjore, and convert the arid wastes of Râmnâd into a garden.

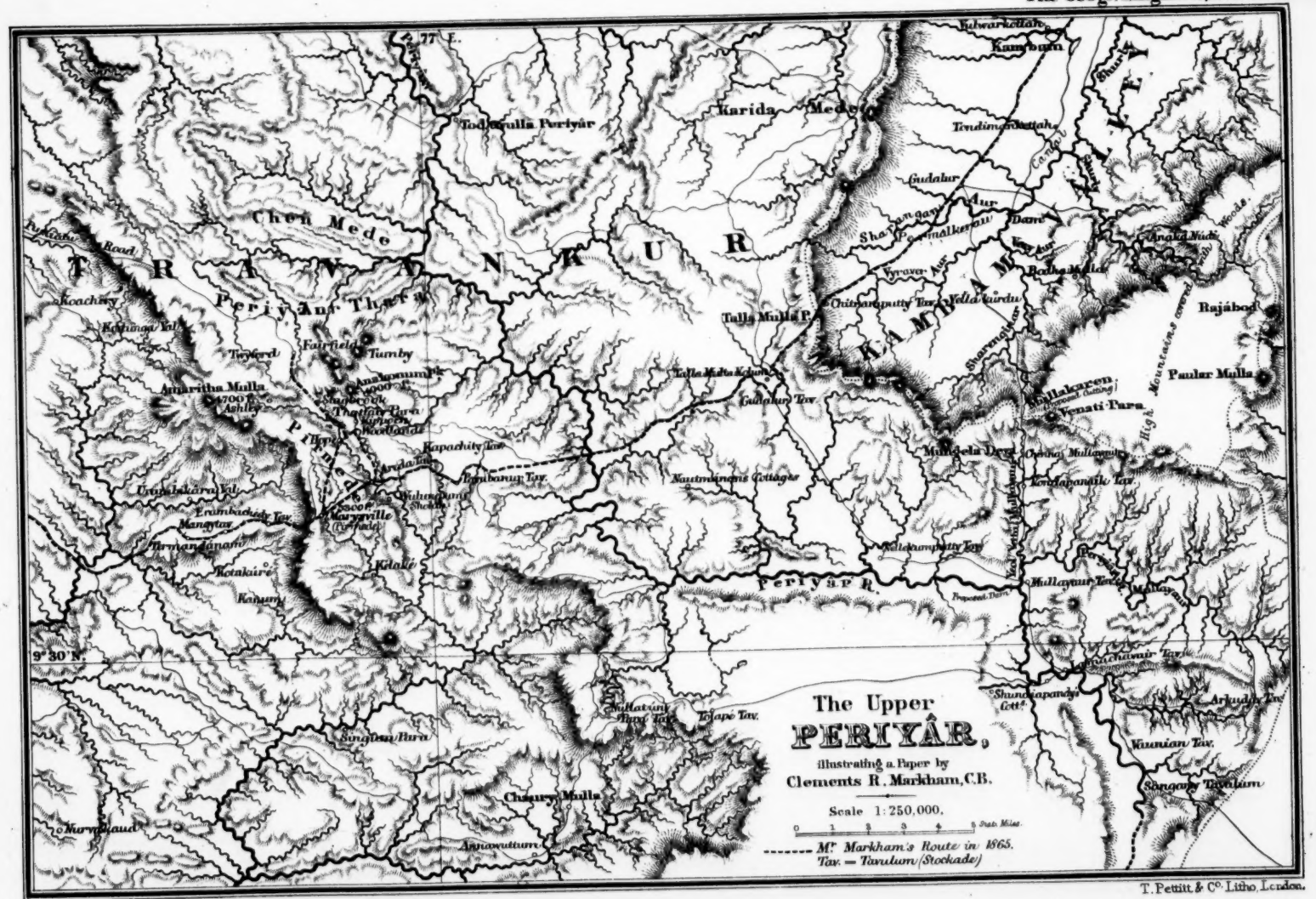
This is but one of many services which England owes to India. There are many more irrigation works which should be constructed, many irrigation systems which are suffering from insufficient funds for maintenance, but the Periyâr project is the oldest. It has now been discussed for nearly a century, and surely the time for maturing it, and for commencing work ought to be at hand. Now as the weary traveller descends from the crest of the mountains towards the Kambam Valley, he catches sight of an expanse of barren land scattered over with the *yerkum* bush *(Calotropis gigantea,)* which is dismal enough, and further on there are patches of *tûr* and *ragi*, and a few umbrella thorns round the circular huts of Gûdulûr. When that crest is cut through, and a future ruler of the land, like Lord Dalhousie on the memorable 8th of April 1854, has "let loose the waters with an easy hand," what a changed country will the traveller behold from his stand-point by the grand old *itti murum*, looking down the Kambam Valley. The patches of dry grain, the dreary milk bushes, and clusters of high-peaked huts, will be replaced by one sheet of brilliant green, with clumps of palm and fruit trees in frequent succession, concealing the new villages along the foot of the hills. Such physical changes by human agency must gladden the hearts of all geographers; and it is to be hoped that more years will not be allowed to pass before the good work is commenced.

C. R. M.

IMPRESSIONS OF JAMAICA.

CHAPTER V. — NATURAL PRODUCTIONS.

THE "crumpled sheet of paper," by which apt simile Columbus figured the island of Jamaica, was inscribed—so to stretch the metaphor—with a much less extensive roll of natural productions when he touched that land of enchantment than it now possesses. Luxuriantly clad with vegetation it was, no doubt, up to the top of its highest mountain, just as we see it from ship-board at the present day; and in all probability there is not one of its countless ferns or orchids but is indigenous. The very commonest weed in the north of the island is that poetical flower, the night-blowing cereus, which, in the prettily plaintive verse of Haynes Bailey, "sheds its perfume and opens its blossoms mid darkness and gloom." Youthful Caribs, ages and ages ago, may have stolen forth on starlight eves to seek those sequestered shades wherein the vestal flower wakes to its nocturnal vigils. Rocks and ravines are clothed with the same varieties of cactus that abounded on the island before its aboriginal inhabitants were disturbed in their possession. But the esculent fruits, the most valuable herbage, and even that grand staple of Jamaica's prosperity in the past and object of her despondent anxieties in the present, *i.e.* the sugar-cane, were brought to her as to a foster-mother. The wild Indian cane which was found on the island by the old discoverers merely gave them the practical hint that the soil was suited to the cultivation of a superior species. Palms of an unfruitful sort abounded; but the cocoa-nut tree was not. Coffee, I need hardly say, came from the east, and took kindly to the mountain soil and air of the Antilles. The numerous mango tribe also found a congenial home, having travelled from the opposite ends of the earth; but only one variety, the famed "No. 11," is fit for the dessert table, all the other kinds being, as I have before observed, turpentiny. Tamarinds, likewise, are an importation from the east. Oranges, lemons, limes, and all the citric growths, hardly distinguishable by foliage though differing so widely in their fruit, were brought by the Spaniard. Such luxuriance is nowhere attained by the orange tree as in Jamaica. All the seasons, except winter, meet without parting on those boughs, which at one time are laden with bud, blossom and fruit in all stages of development, from the small green sphere, hard as a racket-ball, to the ripe, rich, full-grown golden globe. The pine-apple is, I believe, indigenous, and so, it is said, are the papaw, guava, sweet sop, sour sop, cashew-apple, custard-apple, star-apple, and naseberry. There is some difference among authorities as to the parental claim of Jamaica with regard to a few of these fruits; but I give them the benefit of the doubt, or it might seem as if I wished to deny all original merit to the Jamaican climate and soil. These are in truth marvellously prolific, and in many cases appear to be better adapted to the increase of imported plants than even their own native conditions could have been. The guinea-grass flourishes at least as vigorously and with as amazing a rapidity of growth wherever its seed falls in Jamaica as it does on African fields. Yet it was actually brought to the island for no other purpose than feeding the aviary of Chief Justice Ellis, who only found out by accident the importance of the herb for grazing. Before his birds had finished their supply of the new grass-seed a handful was carelessly scattered, and lo! a crop almost as magical as Jack's undying bean-stalk was the speedy result. It is a common thing to see a field of this grass in which cattle are feeding, and yet not to perceive that they are there at all. So nourishing is it that horses will work on that food alone, with but an occasional treat of corn. The plantain, as great a natural boon to the human animal as guinea-grass is to the brute, is included by Bryan Edwards in his enumeration of productions "spontaneously bestowed on the island by the bounty of nature." Whether indigenous or not, this inestimable food propagates wonderfully on all the lands, high or low, in Jamaica; and its qualities entitle it far more deservedly to the name of "bread-fruit" than do those of the



E. G. Ravenstein, delt.

T. Pettitt & Co. Litho. London.

spongy, woolly, disappointing fruit which is generally so styled. I do not think I was ever more sadly *désillusionné* in all my life than when I first handled and essayed to eat what is called bread-fruit. In common with all strangers who behold it growing, I was very favourably struck by its appearance on the tree. An eminent naturalist, Mr. Gosse, describes it as "hanging by scores from the thick, many-jointed twigs;" and adds, "the enormous leaves, eighteen inches in length and breadth, elegantly cut into fingers, and of a beautiful green, well set off the large depending fruit, and seem to suit its colossal dimensions." This truthful picture recals vividly the first view of the prolific tree which only yields in luxuriant beauty to the mango. On the short single line of railway between Kingston and Spanish Town, which was the only iron road on the island a year or two ago, and which has since been extended to Old Harbour, a distance in all of 20 miles, I have many times passed a pen like an English park, thickly studded with trees that might well do ornamental duty for oaks and elms, but far denser and brighter of foliage. They were mango trees. The leaf is dark in hue, but very lustrous. So compact a mass of foliage is presented by no other tree that I know. It towers to a great height in the shape of a cone, and as the leaves are much liked by cattle, these animals in browsing keep the broad base as evenly cropped as by the shears of a Dutch yew-trimmer. On that same little railway-run, with the alligator-swamp and pestilent shore of the lagoon, as black as Styx, and covered with a rotting undergrowth, on one hand, and with the well-kept pens, backed by the Port Royal and Liguanea Mountains, on the other side, I have as often noted a cotton-tree of prodigious girth—one of the largest in the island. As cotton is cultivated, with more or less remunerative result, in Jamaica, it is necessary to observe that the cotton-plant which bears cotton, and the so-called cotton-tree which does not, have no relationship whatever. Of the shrub, enough is known, or may be learned, from any one of a score of readily accessible books. Indeed, there are specimens in the tropical department of the Crystal Palace, and elsewhere, which may be seen by any of us who will disburse a half-crown and take the trouble to look about us. But the general reader may be pardoned for doubting whether a full, minute, and authentic account of the cotton-tree, or silk cotton-tree, as it is sometimes called (*Eriodendron anfractuosum*), exists in the English language. This is one of the giants of the vegetable kingdom. The trunk of such a specimen as I have now in my memory would measure not less than forty feet round. But vast as is the circumference of the Jamaica and Demeraran cotton-tree—a cousin-german of the *Bombax pentandrum* of equinoctial Asia and Africa—the magnitude of the trunk derives an addition, scarcely fallacious, from the immense spurs which radiate therefrom, and which, being of the same pale hoary grey as the tree itself, resemble stone buttresses, elongated, as they diminish in height into low walls. At their junction with the trunk, these sloping spurs are in some instances more than twice the height of a tall man. They maintain an almost uniform width throughout down to the point of their disappearance in the ground, and this width is rarely more than ten inches or a foot, which in fact would be the ordinary thickness of a boundary wall or stone fence. The resemblance to an artificial structure is greatly strengthened by the disposition to squareness and angularity, the top surface, as well as sides of the spur being often quite flat. The very irregularities in the outline and contour of these vegetable landmarks—for such they are, and I have now lying at my elbow a *Sailing Directory* for the northern part of the West Indies and the Mexican Sea, which instructs mariners sailing westward for Port Morant to observe as a mark one of these large cotton-trees near the Anvil Rock and Fort Pera—suggest an architectural method. They are just such deviations from uniformity as we perceive with admiration in Gothic art. And there is a peculiar justification in what may seem a fanciful comparison of the cotton-tree to a ruined tower. It is one of the few, the very few, tropical trees that are periodically denuded of their leaves; nay, it remains bare for a longer time than many trees of temperate or nearly frigid latitudes, whose branches are stripped by killing frosts and sharp boreal gales. For seven, eight, and even ten months, the boughs of the cotton-tree are completely defoliated. I have, for five months together, during which time the thermometer stood mostly above 80°, watched this leviathan of the forest, and to the last I have been unenlightened as to the character of its foliage. The limbs, each as big as an English elm, and bleached whiter than an ash, shoot forth horizontally, though with strange, weird contortions, to an immense distance, thus giving a singular contradiction to the theory broached by the amiable Autocrat of the Breakfast Table—a famous authority upon timber—that the reason why the oak has become the symbol of strength and endurance is that it alone does not shirk the work of resisting gravity, but defiantly chooses the horizontal direction for its limbs, causing their whole weight to tell, and then stretches them out 50 or 60 feet, so that the strain may be mighty enough to be worth enduring. Now, without yielding to any man in hearty respect for the opinions of Mr. Oliver Wendell Holmes, I venture to traverse that very pretty and plausible idea. It so happens that our *Eriodendron* or cotton-tree, though a giant, is at the same time a weakling. He has no heart like heart of oak. Outwardly he seemeth a pillar of strength, a brave and sturdy beacon, buttressed with the hewn rock. He has need of his buttresses, truly, for no structure is more frail or fallible than that imposing trunk. And yet it is this same tree, more fragile than the mulberry and so soft that the indolent negro prefers it of all manner of wood to work upon, that does indeed choose the horizontal position for its enormous limbs, stretching them forth vastly beyond that range of 50 or 60 feet which is modestly allowed by the delightful author of *Elsie Venner* and *The Guardian Angel* to his favourite oak.

Except for making canoes, by the primitive method of hollowing out the trunk or a branch thereof—a process which, in the case of any better class of timber, might be considered barbarously wasteful—the cotton-tree is well-nigh useless. Conspicuous by its gigantic proportions, and noteworthy for its picturesque grandeur, it is, in all other respects, insignificant. The fine filament that bursts in masses from the ripened pods, and resembles a hank of raw silk with its golden tint dulled to a pale bronze or lustreless brown, looks

temptingly like a soft and generally superior description of cotton; and a stranger would be apt to say—"Ah! here is another sad example of neglected wealth in this idle, thriftless colony." If the reader has ever seen and handled that delicate object, a humming-bird's nest, he will have felt the exquisite softness of the silk-cotton tree's fibrous down. But let him pluck a tiny portion, and place it under a microscope, and he will soon perceive that the silky fluff has no quality of cohesion. These fibres, in the words of Mr. Gosse, have "neither the twisted form of true cotton, nor the jointed appearance of linen, nor the imbricated surface of wool." It might, indeed, be a rather poor substitute for eider-down in stuffing pillows or cushions; but these articles are not much required in a warm climate, and the compression of the flossy fibre for exportation would deprive it of the little elasticity it possesses. Having quoted Mr. Gosse, whose short stay at Bluefields, and whose scientific rambles in other parts of the island of Jamaica, were turned to excellent account in his volume published in 1851, I would refer all who may be interested in the subject of this curious tree, to that same book, in which will be found a full botanical description of the *Eriodendron anfractuosum*, furnished to the author by his friend and fellow labourer, Mr. Richard Hill, Member of the Council of the Royal Society of Agriculture of Jamaica. Mr. Hill tells us something very curious about the growth of this tree. He says that it is only in the early period of its life that it exhibits a growth by concentric layers; that it is observed soon to become ventricose at a short height in the trunk, being thicker about the middle than lower down towards the root; and that up to this time the bark is armed with strong spines, which are obliterated when the ventricose character disappears. "After this state of progression," says Mr. Hill, "it commences throwing out buttresses from the trunk to the long, radiated roots, which now show themselves on the surface of the soil. When the growth has advanced to this condition, the wood is no longer deposited in the lower part of the tree in concentric lines of regulated thickness, for the sap, both in ascending and descending, instead of being equally distributed under the bark, is now running in streams from the main branches, and forming those projecting spurs that obliterate the angles from the main roots; and the result is a ligneous deposition of greatest density where the streams strike off from the trunk. With this unequal deposit of wood is accomplished those flattened buttresses which become so remarkable a feature in this gigantic tree." Another and yet more wonderful property of the *Eriodendron*, or Ceiba, as it was called by the Indians, is the production of leaves and flowers in alternate years. "When seen with its seed-pods at the terminal twigs, dotting its immense mass of stems and branches all over, it has not yet expanded into leaf: the foliage is still enclosed in the leaf-bud. At this time it is much more an emblem of hope than Moore's almond-tree in Lalla Rookh; it not alone blossoms but matures fruit on a leafless stem." And again; "It frequently happens that one half of a silk-cotton tree, or some particular cluster of stems and branches, has an alternation of leaves and flowers in a different sequence of years from other parts of the tree. This deviation from what has been here laid down as the economy of the whole tree is very intelligible as a new condition of parts of the tree. It must have been seen that in the long run an *Eriodendron* or Ceiba, in distributing its sap in streams or lines from the main roots to the main stems, must change from an united to a divided economy of vegetation—that, instead of regulating its functions as one tree, it would set up an order as a bundle of trees clustering together in one column. Now it happens from some factitious circumstance, that one side of the tree or one set of branches have suffered some interruption, or have been forced into some acceleration of functions as great evaporating organs. This may have been a diminished growing property in the terminal twigs, or an increased nutritive power in a part of the roots; and nourishment may have been retarded, or oversupplied, in the portions of the tree which have gone out of equilibrium. Be it whichever it may of these causes, the alternation of foliage and flowers has been changed; and a half, or less or more than a half of a silk-cotton tree, may be seen in luxuriant summer foliage—a marvellous pile of verdure—and the other part bearing flowers and fruit on a leafless stem."

I have been tempted thus far into citing Mr. Hill's elaborate account of the cotton-tree, purely by the consideration that the peculiarities detailed by him have not engaged the attention of other naturalists. There is some excuse for such scientific *laches*. Mr. Hill himself says it requires a residence of five years in Jamaica, or observations during two successive alternations of flowers and foliage, and the commencement of a third, to gain a knowledge of this amazing tree.

Parasitic growths are, if not peculiar to Jamaica, at least characteristic of its vegetation in a remarkable degree. "The Creole in the hug of the Scotchman" is a jocular phrase often applied in describing a tree which has wasted or is wasting to decay under the close embrace of the wild fig or some other trailing and clinging plant. That word "Creole," by the bye, is very differently used in England and in the Antilles. Here, at home, a vague idea prevails that any human being termed a "Creole" must have a tinge of the negro blood in his veins; but this, so far from being correct, is the very reverse of correctness. I saw, not long ago, in one of our London police-reports, the description of a prisoner who was said to be "very dark-complexioned, and apparently a *Creole*." The word has nothing whatever to do with colour: there are Creole whites, and Creole negroes, and Creole half-castes, and Creole timber, and Creole beef and mutton. To have been *born on the island* constitutes anything's or anybody's being a Creole. The original word "Criollo," did indeed signify, to the exclusion of all other meanings, a white person born in the West Indies. You could not have applied the Spanish or the English term, in olden times, to any but a pure-bred white man or woman. In Jamaica and other English islands of the West Indies, the word "creole" came in time to include every native person, black, white, or brown, and every native production. Notably, we speak of Creole negroes and African negroes with a purpose of distinction, the former being descendants of the old slave stock, emancipated in the last generation, but still clinging to the soil, and the latter being immi-

grants from the Gold Coast, many, indeed, having been rescued from piratical slavers, and having, when the choice was given them at St. Helena, of going back to Africa, or being carried on to Jamaica, elected to proceed "anywhere, anywhere," rather than return to the delights of existence under a sable monarchy. Thus, it will be seen that while the Jamaican use of the term "creole" is undoubtedly corrupt, it is corrupt by deliberate extension of its original meaning; whereas in England it is corrupt by perversion of that meaning entirely. To exemplify the common and frequent application of the word in Jamaica, I will just observe that the cheapest kind of wood used for flooring is "Creole mahogany," the Honduras kind being much better and higher in price; and that I was once presented with a case of what the kind donor assured me were "Creole pickles," as contra-distinguished from the imported abomination.

GODFREY TURNER.

SUGAR AND THE SUGAR-CANE.

MR. LOWE, in his financial statement on the 7th April, 1873, described sugar as "a sweetener which enters into all sorts of food—the delight of children and the solace of age." As many old ladies drink their cheering cups of tea *without* sugar, the latter part of Mr. Lowe's description can hardly be accepted as absolutely correct. There can be no doubt, however, that there is no article which is so generally consumed in some form or other as sugar, and it is only reasonable to suppose that a few remarks respecting its manufacture and the cultivation of the cane will be interesting to the most casual reader.

Many persons will doubtless be "surprised to learn" that in 1873 833,489 tons of sugar were imported into England. As the prices vary from 14*s.* to 31*s.* per cwt., 21*l.* per ton may be said roughly to represent the average value of each ton. On this basis the value of the trade, in 1873, reached the enormous total of 17,500,000*l.*

The following table shows from whence the bulk of this article was received in its unrefined state in that year, and its value:—

	£
British West Indies and Guiana	4,799,788
British India...	478,150
Mauritius	1,009,666
Spanish West Indies	4,038,346
Brazil	2,083,206
Java and Phillipine Islands	1,061,050
Other countries	3,750,327
Total...	£17,220,533

The above return must not, however, be regarded as representing the total amount exported from our principal possessions; as, for example, from Mauritius, in 1872-73, the total value of the export was 2,489,652*l.* More than half of the sugar made in that colony is taken up by the Australian colonies and India—for out of a total of 253,492,623 lbs. exported in the year named, 94,220,000 lbs. went to Australia, and 27,142,000 lbs. to India.

The finest qualities of Mauritius sugar are not imported into England, but as a rule find their way to Australia and Bombay.

The cultivation of the sugar-cane is peculiarly exposed in Mauritius to injury from hurricanes, as well as from insect plagues, two of which—the borer and the "poua pache blanche"—are particularly destructive. The former insect is furnished with a horn like a screw, by means of which it perforates the canes. It was estimated, in 1861, that the crop fell short by 20,000 tons of what it would otherwise have been owing to the destructive agency of this caterpillar.

Sugar-canes, when ripe, are about 12 feet high, and 2 inches in diameter. As soon as the plant blossoms the leaves begin to wither and die, and the cane changes its colour. The cane having ripened is cut, tied up in faggots and conveyed to the mill, where it is crushed by means of cylindrical rollers, the juice falling into large vats placed for its reception beneath.

In no part of the world has the manufacture of raw sugar been brought to a higher state of perfection than in Mauritius. Every improvement, alike in the process as in the necessary machinery which modern science has brought to light, has been eagerly taken advantage of, regardless of expense.

The *modus operandi* in the manufacture of sugar is now so generally known, that it is needless here to refer to it in detail; suffice it to say, that on almost every estate the vacuum-pan system, by which an immense saving in time is effected, is now adopted. When granulation has taken place, the time allowed for which varies according to the size of the crystals it is sought to produce, but may be said to be about four hours, the sugar is allowed to run out through wooden troughs into large iron tanks to cool, and afterwards passed through the "turbines" (centrifugal machines), which, revolving at the rate of 1000 rotations per minute, eliminates all the syrup from the sugar. During this process, water is added in more or less quantity, according to the degree of whiteness which it is desired to obtain.

For the last three years, to obtain a more perfect degree of whiteness in the crystallised descriptions of sugar, a system has been pretty generally adopted in Mauritius known as the "procedé Icery," so called from its owing its origin to the Hon. E. Icery, M.D. It consists in the use of monosulphite of lime for the better purification of the vesou (cane juice). The "clairce" after leaving the battery being treated by this process previous to passing into the vacuum pan. The syrup as it issues from the turbine is collected in reservoirs, to be again brought back to the vacuum pan, producing sugars known as first, second, or third syrups. The residue or molasses is finally appropriated to distilling purposes.

Since the introduction of steam-mills and machinery the cultivation of the sugar-cane has nearly superseded all other kinds of agriculture in some of our possessions. In Trinidad and one or two other of the West India Islands great central factories or usines have been erected either by companies or by the local governments. To these factories the different estates in the islands send their canes, and some of them are capable of manufacturing from forty to fifty hogsheads of sugar per diem.

Reference has been made to the annual exports of sugar from Mauritius to Australia. It may not be generally known that a formidable competitor for this trade has lately arisen in the colony of Queensland, and that, besides providing for its own consumption, it has already commenced the shipping of sugar to the neighbouring Australian colonies.

Sugar-growing is already included amongst the prominent industries of Queensland, and the sugar commands a good price.

The rich scrub and forest lands on the banks of the rivers along the coast, from the southern boundary to lat. 18°, are admirably suited for the cultivation of the cane. A refinery has been established, and several mills are being erected. In 1865 there were only 450 acres of sugar crop, against some 10,000 in 1872.

Sugar being an agricultural product which has started into existence in this young colony within the last few years, and a large and increasing area of country being taken up for its growth, the industry will certainly soon assume very large proportions. The growth of the cane is one of the best paying agricultural pursuits of the colony.

The general prospects of sugar cultivation and manufactures are clearly in the ascendant, and it would be presumptuous to attempt to fix any limit to the probable extension of this already enormous and profitable trade. In the year 1700 the quantity of sugar imported into this country was about 10,000 tons, whereas, in 1873, it was 833,489 tons. Sugar, therefore, is not only one of our principal articles of importation, but one of the most indispensable necessaries of life.

W. ROBINSON, F.R.G.S.

THE HIGHWAYS AND BYEWAYS OF NAVAL HISTORY.

IV.

CAPTAIN GEORGE ST. LO AND HIS TIMES.

AMONG the many quaint and amusing characters with whom the searcher through early naval books and documents is sure to make acquaintance, I have not met one better worth a few moments' attention than he whose name heads this article. The man was a Captain, and afterwards a Commissioner of the Navy, and the time in which he flourished was the last decade of the 17th century, and the first of the 18th. In his character I trace that odd mixture of shrewdness and simplicity which seem to me to have been typical of the era in which he lived, and which was so very conspicuous in his former brother Commissioner, Samuel Pepys. But, however amusing the examination of such a character may prove, its real value will be found when it is combined with contemporary circumstances; we then get a glimpse at that controverted point, how far the man makes the condition, or how far the condition makes the man?

The Revolution of 1688 appears to have seriously affected the welfare of the navy. The order and discipline brought about by Charles I. naturally fell to pieces when his Lord High Admiral, the Earl of Northumberland, sided with the Parliament in 1642. It was then a question of hours whether the Royal or the Parliamentary Admiral got command of the fleet, and it followed, naturally, that the sense of duty and obedience which had always characterised the seamen, was strangely perverted, and disarranged by the setting up of such rival claimants. Blake and his colleagues fully restored the balance by leading the sea forces to the conviction that they served their country, and were outside and above its political troubles. But the fleet became again a political engine—though unused—when James fell; and in losing a king, who even on the throne managed the details of the service, the navy lost a head for whose place no efficient substitute was for some time found. William was a soldier, and the Dutch, who as enemies had taught us so much, no longer acted in that capacity. The consolidation of the New Government at home, and the subjugation of Ireland, occupied the attention of the best men in the State, so that however vigorous the naval administration of the day may be considered, its vigour was misdirected if we are to judge by the results. It was a time of great peculation, discontent, and mismanagement; and in consequence a time of many miscarriages at sea.

Mr. St. Lo was employed in command of a ship in protecting our East Coast Fisheries in 1685, before the war with France broke out, and one of his quaint ideas he there had the power of carrying out. His duty was to prevent the Dutch, who sent some 3000 fishing vessels, and the French, who sent about 100, from fishing within sight of our coast. The French—"finding the sweetness," as our gallant captain expresses it, "would be pressing in for the shore," for which reason "he sometimes took several of their masters on board him, and then set sail to the open sea, and there put them all on board one of their vessels, to show them sea-breeding, and, they having no boats, were two or three days before they could get into their own vessels again; and this," he says, "I did purposely, that they, of all others, might not have the encouragement of overrunning us in our Fishery."

The war which broke out with France after the Revolution, proved to St. Lo the destruction of his immediate hopes; but by one and the same incident, the foundation of his fortunes. He commanded the 'Portsmouth,' a fourth-rate, carrying some 200 men, and, in 1689, she had the misfortune to fall into the clutches of a 60-gun Frenchman, the 'Marquis,' commanded by Chevalier Demany. The little 'Portsmouth' fought a gallant fight, St. Lo being badly wounded, and the ship so disabled that she could not be brought into port. But the odds were too great, and St. Lo, with his ship's company, was carried to Brest. He was a sort of man who shut his eyes to nothing, and as the hospital to which he was conveyed overlooked the dockyard, he kept them particularly wide open, and noted, to his great surprise, that they did the thing much better in France. "I was astonished," he says, "at the expedition used in manning and fitting out their ships, which, till then, I thought could be done nowhere sooner than in England, where we have ten times the shipping, and, consequently, ten times more seamen than they have in France; but there I saw twenty sail of ships, of about sixty guns apiece, got ready in twenty days' time; they were brought in" (after their return from landing troops at Kinsale and Cork), "and the men discharged; and, upon an order from Paris, they were careened, keeled up, rigged, victualled, manned, and out again in the said time with the greatest ease imaginable. I likewise," he says, "saw a ship of 100 guns there; had all her guns taken out in four or five hours' time, which I never saw done in England in twenty-four hours—and this with greater ease and less

hazard than here, which I saw under the hospital window."

The ships being so soon got out to sea after being dismantled and paid off, set St. Lo thinking as to how the men were obtained; and thought set him upon enquiry, for he knew that under the English system the re-manning of such a fleet in the time was a sheer impossibility. He then lighted on the precursor of the present *Inscription Maritime*. The system had been established by Louis about the year 1675, and seemingly answered extremely well.

In both the material and the personal arrangements of their navy, St. Lo thus discovered that the French had an advantage; and the conviction determined him to bring the matter under the notice of his own government on his release from prison. He did so in a year or two later, and in 1693 published the substances of his new ideas in a small book entitled *England's Safety; or, a Bridle to the French King*, a work which helped to make him a Commissioner of the Navy, to give him the command of the new yard at Plymouth Dock, and to christen him with the nickname—which he bitterly resented—of "The Navy Board's Darling." Thus the loss of his ship, and his wounds, together with the seemingly unimportant fact that the window of his sick prison overlooked a French dockyard, became for him the bases of his prosperity.

When the navy breaks out in pamphlets we may generally assume that something is very wrong, for the seaman is not a penman as a rule, and it is commonly hard to drive him to foolscap. In St. Lo's time there was a good deal of naval pamphleteering going on, and the publications teemed with the loudest complaints, and the direst forebodings as to the material and moral condition of their Majesty's naval service.

"Great Britain's Groans:" writes Mr. W. Hodges in his title, "or an account of the oppression, ruin, and destruction of the loyal seamen of England, in the total loss of their pay, health, and lives, and dreadful ruin of their families." In another pamphlet he gives "A Dialogue concerning the art of Ticket Buying. In a discourse between honesty, poverty, cruelty, and villainy, concerning that mystery of iniquity, and ruin of the loyal seamen (1695)." Then comes (1699) "Ruin to Ruin, after Misery to Misery. Being the distressed and ruined, and perishing state of the loyal and faithful seamen of England." We have also (1691) a great series of complaints from "Mr. Henry Maydman of Portsmouth, aged fifty-two," who gives us a long-winded story—sometimes not very clear—in "A modest and brief discourse of the Royal Navy of England." Mr. Maydman cuts at the captains, especially at the "Gentleman Captains," and thereupon Mr. St. Lo has something to say on the other side. "It may be objected," he remarks "(perhaps from a book lately set out by one Henry Maydman, a purser), that seamen are discouraged from their Majesty's service by the abuses of their commanders: to which it is answered; it is a sign that *that* purser hath sailed with honest captains that would not let him pinch the men; for the men never fare better than when a captain and purser disagree. I observe he carefully conceals his employ of purser, well knowing that of all officers such a one in this case is the least to be credited; for let commanders see that the pursers do not wrong the men, and let them be paid their Majesty's allowance, and the tickets at payment of the ships, or upon tender afterwards, they are very well encouraged and care not for hard words from a captain, which break no bones." By this we see that St. Lo was not at all inclined to let a comparative outsider fling at his cloth with impunity, though he did not on other occasions hesitate about doing the same thing himself.

A small pamphlet "humbly offered to the Honourable House of Commons by an English sailor," in 1699, attacks the victualling, and says, "Had the mismanagements of the navy tended only to the consumption of our wealth, the loss might have been repaired; but when our sailors are poisoned by bad provisions, or starved for want of good, the loss is irreparable. Thus, the blood of war is profusely spilt in louzy hammocks, stagnated with noisome scents, and the flower of our youthful sailors smothered in unsuccessful and needless voyages, who might have won to themselves and the nation immortal wreaths of honour in noble attempts against the enemy." As a specimen of confused idea and of confounded simile, the passage might take rank with some which Macaulay has held up to everlasting derision; but "A Well-wisher to the Royal Navy of England," in 1700, found a much more satisfactory point in his opponent's armour. "By what means," says this indignant gentleman, has the pamphleteer "rendered himself so great a proficient in maritime affairs since the time he inspected the quartering of beasts? *(Clerk in the Cutting House at 40l. per annum,"* says a marginal note with cruel insinuation), "and how can he, with as much ignorance as confidence, pretend to judge of the actions of those gentlemen who have been employed in the Admiralty, but also of what lamentable effects will attend the administration of the present commission, with the person" (Mr. Burchet) "who now has the honour to serve as secretary thereunto? What satisfaction he can give in these particulars I cannot forsee; and, therefore, shall conclude that he has, over a *pot* and a *gill*, took them on trust; and that being inspired with the potent liquor, he has dished them out so as to agree with his own squeamish stomach."

Other passages of the former pamphlet deal less with simile, and are more direct and more vicious.—"The sailors' case is indeed deplorable; kept long without pay, sometimes six years; forced to sell tickets to raise a little money for their families at half value, though as good and brave Englishmen as any, are altogether enslaved, and without any law that I ever heard of, impressed; their liberty taken from them, which, when gone, they are effectual slaves, imprisoned on board ship, caned and kicked by commanders, just dropped from behind a coach at Whitehall into the service of the navy; miserably abused in being turned over from one ship to another (contrary to the rules of humanity and the custom of the navy), so that after they have been at sea several years are hurried out again without liberty so much as to see their relations. Now, all things considered, what encouragement have mariners to serve their country in the navy? The only thing they have a seeming certainty of is their meat and drink, and to be cheated of that, too, is the devil." In another place he says, speaking of the West India Station, "A hot country, stinking meat and maggotty bread, with the noisome

and poisonous scent of bilge-water, have made many a brave English sailor food for crabs and sharks." But it is when he attacks the head-quarters of the alleged jobbery and mismanagement that he rises to the height of eloquence—if the eloquence be of a peculiar kind—and thus again his similes get the better of him. "But then the mismanagement of this office" (the Victualling Office), "and of the navy, proceed from the Admiralty, as filthy springs from an impure fountain, these being but branches of that accursed tree that has yielded the nation such sour fruit as to set all our sailors' teeth on edge" (he calls it *edg*). "An office managed, we know not how, nor to what purpose, for I dare engage to pick out as many old women in Wapping that should have managed the affair more for the honour, glory, and advantage of the English nation. The Queen of Sheba, when she gave her visit to Solomon, extolled his wisdom, and his servants. Our Solomon (William) is indeed worthy of honour, who has been the care of Heaven, as these nations have been his, and the Queen of Sheba might justly have done him the same honour, could she have come hither; yet I engage she would have left out the latter part of the compliment, and took little notice of *the sitting of his servants* in the Admiralty, of their virtue or wisdom. She takes no notice of Solomon's nor Hiram's navy, yet the Scripture tells us they were under the conduct of shipmen that had knowledge of the sea; and, in another place, that their loading was apes and peacocks, but tells us nowhere that apes and peacocks had the sovereign command in sea affairs, or that landsmen were proper persons to command men-of-war."

The gentleman who replies to this pamphlet, and whose language bears a strong resemblance to that of Mr. St. Lo, might possibly have objected that these words were not very applicable to Sir Cloudesley Shovel, who was Comptroller of Victualling; to Sir George Rooke and Sir David Mitchell, who were Naval Lords of the Admiralty; to other sailors—like Mr. St. Lo himself—who was a Commissioner; and singularly inappropriate to the Secretary to the Admiralty, Mr. Burchett, who had served some time afloat, and, especially as Secretary to Admiral Russell, afterwards Earl of Orford, the hero of La Hogue. But the defender of the officials never meets him in this way, or by any attempt to disprove his statements. He rails on him in the ordinary *tu quoque* manner, tears off his anonymous cloak, and discloses the features of "Mr. Henry Maydman, of Portsmouth, aged 52," against whom Mr. St. Lo is so wrath because he was a purser and did not confess to it.

Now Mr. Maydman's pamphlet—*The State of the Navy, considered in relation to the Victualling*—was written either by an obscure person, whose statements might be passed by as the mere vapourings of disappointed hope, or it was the work of a man who had an opportunity of learning the truth, and who might be expected to state it, however clumsily. In the first case, we should not hear of any opposition. In the second, a semi-official contradiction might be expected, and if that contradiction fails to meet the facts alleged, there is very good reason to credit them.

Now, Mr. Maydman's pamphlet reached a second edition. Mr. St. Lo—if I may father the rejoinder on him—replies not only semi-officially, but under the direct prompting of Mr. Secretary Burchett, yet he hardly attempts to do more than offer a general denial to Mr. Maydman, his only strong point being his assertion that the Lords of the Admiralty offered Mr. Maydman the opportunity, which he thought proper to decline, of bringing definite charges against definite people. It was for the best of all reasons that nothing better than railing for railing was offered in rebutting the charges of Mr. Maydman, Mr. Hodges, and others. The charges, however wildly put forward, however garnished with ornaments of speech borrowed from the banks of the Thames below bridge, were true to the core, and no one was better aware of it than Mr. St. Lo.

The navy was short of pay, short of victuals, short of the gratitude of the country it served. It too often saw Court influence raise a man, and public service depress him. Parliament made its usual spasmodic efforts and came down heavily on the unfortunates who happened to stand in the way of the momentary squall. It had recently called Sir John Parsons, and his brother commissioners of victualling, before the bar of the House of Commons, and had swept them away—Mr. Maydman says, because "they put guts in the beer, and galls in the beef"—but it all went on just as before. The *tone* was low, a thing it is very easy to depress and very hard to raise. The country put no faith or confidence in its naval servants, and its naval servants, civil and military, fell to the level appointed for them.

The commissioners realised handsome estates out of their various purloinings. Mr. Maydman says that at the Victualling Office there might be seen "an undescended wretch . . . . advanced from threadbare clothes since the Revolution to the sum of 20,000*l.*, got out of a salary of 80*l.*" a year. Sir C. Shovel conceived "there might be villainy in the chest at Chatham." A commissioner who succeeded Mr. St. Lo at Plymouth Dock, in 1708, employed something like twenty-eight men—joiners, wheelwrights, and cabinet-makers—on his private concerns, and when inquiry was made, it was found they had built for him several coaches and carriages, cabinets, bedsteads, wardrobes, couches, chairs, tables, and other furniture, to an amount which occupied several pages of foolscap in enumeration. But though there was terrible work at the Navy Board on the discovery of such a scandal, none of the blame came immediately to "their affectionate friend," Mr. Commissioner Wright. The inferior officers of the yard, who permitted—because they could not help—the peculation, did not escape so easily. "We are," writes the Navy Board, "sorry to find that since you had so little to say for yourselves as to the several matters charged upon you . . . . as indeed you could not have much, the same being generally matters of fact—you should think to amuse us with compliments, flourishes, unusual words, and strained sentences, generally ungrateful, seldom acceptable, and wholly improper in business."

I have seen abundance of official documents which show how the canker of corruption flourished and struck root. The surgeons were known to sell their medicines and medical appliances. The boatswains and carpenters drew stores at Portsmouth, sold them, and drew fresh supplies at Plymouth Dock. The captains and masters must sometimes have shared the plunder. One captain seized a neutral, laden with a valuable cargo. He took from her a large amount

of rough gold which he distributed amongst his friends and relations for safe custody. It took the Commissioner of Plymouth Dock three weeks' searching in Devon, Somerset, and Cornwall to recover 9000*l.* of it. The feeling of honour, as now interpreted, was then unknown in naval affairs. Captain Ramsay, who commanded a ship lying in the Catwater at Plymouth, fell into the clutches of the sheriff's officers. He gave his word of honour that if he was permitted to go on board his ship for some necessary purpose, he would return into custody; but he no sooner reached her than he defied the deluded officers, and dared them to attempt to take him. For this abominable breach of faith he was commended to the Admiralty by his official superiors, and I could find no sign that the Admiralty took a different view of the transaction. It was at this period no uncommon thing for officers of the navy to be under arrest in gangs on charges of embezzlement, and I cannot find that any station, high or low, connected with the naval service, was exempt from the suspicion, if not from the direct charge, too often proved, of embezzling Government money or Government stores.

It was to mix with men under these charges, or guilty of these corruptions, that St. Lo returned from his French prison and, full of new notions of the fitness of things naval, published his *Bridle to the French King*.

The crying evils under which the military part of the navy then suffered were, the system of impressment, the shortness of the victuals, the irregularity and delay in seamen's pay, and the rapid fouling of ships' bottoms. Of the last I shall say no more than that no one who has not rooted amongst the original records of the navy, can have any conception of the magnitude of the evil; that it took nearly a hundred years to discover and apply the remedy; and that, if there was war to-morrow, I conceive we should have a complete revival of the old complaint.

With Mr. St. Lo's experience of the methods adopted in France, where the king had registered the whole maritime population, and had them under his control on any emergency, it was naturally the manning of our own ships which most exercised his thoughts. He found that whereas in France the maritime population had a recognised duty to the State, and that each man had definite services to perform, his English contemporary either avoided service altogether, or was liable to be dragged off at a moment's notice to spend the rest of his life in men-of-war, on short pay and victuals.

Even landsmen were now and then captured for the sea service, with much the same amount of ceremony which African writers associate with the acquisition of negro slaves. Watermen were impressed out of their boats, leaving their wives and children on the parish. Men from merchant ships, just returned from long voyages, perhaps with ventures of their own on board, were snatched away from their property, and without even licence to see their unhappy families. Colliers from the North fell in with the press ketches in the Swin or at the Gunfleet, and were forced to pick up others how they could, paying as high as thirty or forty shillings per man, for working the ships to London. Ships, with perishable cargoes, entering Plymouth for safety on the return voyage, found themselves the victims of legalised piracy. Their men were captured by the pressgang, and they lay with ruined cargoes in Cawsand Bay or the Catwater. The barges plying from the upper to the lower waters of the river Thames, sent their men who were liable to impressment, on shore at Kingston, and shipped others for the remainder of the journey who were not liable to impressment. They then picked up their own men on the return voyage, having been at the expense of keeping and paying them meanwhile. As a general result, merchant seamen's wages rose to 50*s.* and 3*l.* per month, at a time when the man-of-warsman got but the promise of 25*s.* per month. As an instance of Mr. St. Lo's simplicity of mind in dealing with these questions, we have from him proposals for forcing down the rate of pay in merchant ships. He is of opinion that if laws were made ordering that wages shall not exceed 35*s.* per month in merchant ships, and if proper steps are taken for enforcing the law, the rate may be brought down. The steps proposed by him are ludicrous when we remember that they came from a man of sense, who rose by that attribute to some position in the navy. He thinks that the thing would be done if it were enacted, "that if any private sailor shall demand more than the rates aforesaid, that he may be brought to the office to be erected for registring of shipping and small craft, and thence sent on board one of their Majesty's ships of war, there to serve a year as a pressed man." The marvel is that St. Lo should not have perceived that the man under such a law would "demand" nothing, but would wait for the master—who wanted his services so much as to pay 60*l.* a year for them—to offer. And that, even if he so far forgot himself as to make a demand, the very last thing the master who heard him would do would be to bring him under the law, for he thereby put himself to great trouble and lost his man for certain—the very thing he wanted to avoid.

Mr. St. Lo's proposal was to abolish impressment altogether, a proposal which did credit to his sagacity and good feeling; but it never seems to have struck him that the whole thing was a question of money. Impressment might have died a natural death if offers up to the market value of a seaman's services were made by the Government, and the promises were kept. This flaw in St. Lo's argument will, however, be excusable in the minds of those who have noted that down to the present day, statesmen hope to get the command of services at a lower rate than their equivalent in money.

Mr. St. Lo's proposal was the registry of all shipping in England, from the barge and lighter to the foreign-going merchantman, and to impose a *pro rata* man-tax on them in time of war. It was really—though its author shows no sign of being aware of it—a revival of the ancient custom for manning the King's ships; and excellent as Mr. St. Lo's reasoning is as far as it goes, and plausible as the plan looked on paper, it is not a wonder that it was never carried out, and that the pressgangs worked away as merrily as ever—sometimes, as we shall see, under Mr. St. Lo's very excellent and clever supervision.

A man-tax was as great an anachronism then as the revival of impressment would be now. A money tax would have been infinitely easier of collection, but the popular connection of a naval tax with the late destruction of monarchy, probably forbad its contemplation by Mr. St. Lo, as by his contemporaries. The

real difficulty was far above and beyond St. Lo's stretch of power or of vision. France was to be beaten on land, and if she were not beaten on land, all victories at sea were, to William's view, absolutely worthless. The statesman's time and thought, and the country's money, went to augment and recruit the land forces: the navy only came in for what might be spared afterwards. No doubt William was sensible enough, when he had leisure, of the vital import of a strong British navy; no doubt also, but that the cry that went up from all departments of the fleet, ultimately made its mark, if only in the establishment of Greenwich Hospital. But St. Lo and his contemporary pamphleteers were only voices in that general cry, and not always to be singled out.

St. Lo might find fault with a purser for exposing the shortcomings of his own department, but he admitted in many official letters, which I have seen, that the purser was right. "I have been fain," he writes when Commissioner, "to take victuals out of the 'Litchfield' and 'Anglesea' for the 'Weymouth,' to supply her, bread being mightily wanted here, and oft-times beer." There being no Government victualling yards such as were founded later, local contractors victualled the fleet through agent victuallers. That ships ran short of food even in the Channel is abundantly clear, and that they were often forced to sea with the certainty of falling short is clear enough also. For all these abuses St. Lo has no remedy, but he can cover his default by abusing the pursers, and he generally does so, both publicly and privately.

As to his opinions relative to officering the ships, he has a word to say in favour of the gentlemen captains, as against the tarpaulins who have nothing beyond their seamanship to recommend them. "There are a great many people," he says, "who have entertained a notion that those bred up in merchantmen are better seamen than those bred up in men-of-war . . . . . In two years there is more to be learnt in a man-of-war, both as to action, the way of command, and otherwise, than by being seven years in a merchantman; but many hold this" (the former) "argument, hoping thereby to be thought to understand the sea." How many are there, one may ask, even of ruling statesmen, who are now unprepared to argue against Mr. St. Lo? But as to the "gentlemen captains," he says, "The French King, when his fleet is out at sea, is at much greater charge than we, in regard to the encouragement he then gives to his officers, both in pay and provisions, which brings his best nobility to his service, who, when they are sufficiently qualified, are preferred to command, and never makes masters of merchantmen captains of men-of-war, well knowing that there is as great an improbability in most of them to well understand the nature and command of a man-of-war, as 'tis for a gentleman of 500*l.* a year (that perhaps knows well enough to manage his own estate) to understand martial discipline, to command a castle in time of action, or for a captain in the militia to be as fit to make a general officer as one that hath been in several campaigns, sieges, and other actions; and will sooner prefer one of his warrant officers, that has been trained up in his service, than one of them; though that also is very rare, for he will sooner reward them with money for any brave action, and give his commands to people of quality." There was no doubt at the time St. Lo wrote, a great deal of the soundest wisdom in these opinions. Then, and now, there were numerous able landsmen in positions of power, who could not understand that the command of a fighting machine calls for qualities very different indeed from those necessary to the command of a trading or carrying machine. If we applaud the language of a writer 200 years old on this point, how very much must we condemn opposite language at the present time.

My space now draws to a close, and I must not, therefore, stay longer over the examination of St. Lo's opinions. Let me rather conclude, by showing what he became as a government official, when his opinions came into immediate contact with practical necessities. Whether he ultimately fell into the corruptions of his day I do not know; it is suspicious that he should have been dismissed from the commissionership of Chatham Yard in 1714; but so far as I have traced him, he was an upright public servant, according to his lights. Quarrelsome, crochety, and garrulous; unscrupulous in carrying out the public service, but steadfast in attention to it; these were some of the qualities he displayed. Quaint he continued to be at all hazards, as may be gathered from the following items of his public life.

French privateers were in those days more daring than they ever were before or since. They crowded into Hamoaze, and even robbed the wharfs of the Dockyard and Ordnance stores. St. Lo applied that his boat's crew and the watchmen of the yard might be supplied with muskets, instead of the ordinary "Brown Bills." As to his boat's crew he held the arms to be a necessity, "as at his going in and out of the Sound early and late," he ran much danger "of being *knabbed* by some of those lurking fellows."

He could not keep the watchmen of the yard awake by any plans heretofore adopted. No one had as yet proposed the cruel measure of abolishing watch-boxes, nor did St. Lo advise so harsh a proceeding. But he put the watch-box at one end of the watchman's beat, and a bell at the other, and he issued orders that the bells were to be rung every quarter of an hour. It stood to reason that if the bells were not rung at all it would at some time or other come to his knowledge; while if the bells *were* rung, the watchmen could hardly get back to their boxes and go to sleep before the time came to ring again. St. Lo had the pleasure of finding his shrewd simplicity had beaten the drowsiness of the watchmen.

With the naval men who did business with him—always excepting the pursers, of course—St. Lo seems to have kept on good terms. His dockyard subordinates could not have had a pleasant or an easy time with him. I only remember one occasion when his wrath got the better of him with naval people. This was when a ship coming into the new dock, with her guns shotted, let one of them off, apparently at his head, as he walked down towards the ship. His anger was perhaps excusable under the circumstances.

Of his matter-of-fact way of looking at things, I found an instance in his official report of the execution of the 'Benbow's' unhappy captains, Kirby and Wade. These men were coming home under sentence of death, but respited till Queen Anne's pleasure should be known, and were met at Plymouth by orders that they should be shot on arrival. St. Lo writes no special letter, but merely states at the end of his bi-weekly letter to the Admi-

ralty that "Captains Kirby and Wade arrived here yesterday, and are to be shot on board the 'Bristol' at six o'clock to-morrow."

St. Lo, being powerless to abolish the press, was yet brought face to face with the difficulty of manning the fleet. Sir George Rooke never sent home a ship to be "cleaned and tallowed," that he did not press St. Lo for supplies of seamen. What was he to do? There were a great many outward bound merchantmen in the Sound, in Cawsand Bay, and the Catwater. But there were no men in them; their crews were all in close hiding on shore. If the wind came from the eastward, these men would slip off to their ships, weigh their anchors, and be off to sea under cover of night. St. Lo—the seaman's friend—reported to the Admiralty that it would be a burning shame if nothing was done to capture these men, getting 3*l.* per month, when it might be possible by main force to make them serve the Crown for an ill kept promise of 1*l.* 10*s.* per month. But he had a plan which he disclosed to their lordships, and received a hearty licence to carry out. Commissioner St. Lo, the seamen's friend, the Navy Board's darling, and the enemy of all pursers, issued a proclamation wherein he stated that he deplored the liability of seamen to impressment, and especially deplored the condition of the unmanned outward-bound merchantmen. It was his determination to abolish this state of things, and to establish a registry of the seamen in and about the port. All seamen were invited to inscribe their names in this list, and all such should be freed from the press. Moreover, if any of the captains should accidently or wrongfully press any of these inscribed men, a report to him would bring immediate redress. In order that there should be no mistake, he appointed a certain day on which he would inspect the inscribed men on board their own ships, and would then take proper measures for impressing all those who had not inscribed or who did not put in an appearance.

The proclamation gave great satisfaction, as did a supplementary transaction of which only one half was suffered to transpire. St. Lo sent for two captains and bid them press certain inscribed men. This part of the business he did not think necessary to publish. The captains did as they were bid; they pressed several men out of the merchant-ships. The masters appealed in a rage, and in an apparent rage St. Lo sent for the captains and their wrongfully pressed men. "What was the use," exclaimed the Commissioner, "of issuing orders so flagrantly disobeyed? The men must be at once set at liberty, and he would see what compensation was their due."

The splendid conduct of the Commissioner called forth the plaudits of all who were not in the secret. The men breathed freely, inscribed their names by hundreds, and crammed the ships in the bay. The day appointed came; St. Lo had slept in the Sound on board one of the men-of-war. Long before daylight the captains of the other men-of-war were summoned to meet him. They started in well-armed boats to the unhappy and deluded merchantmen, and before breakfast-time 350 prime seamen were safe under hatches for the service of the fleet under Sir George Rooke!

Such a man was Captain George St. Lo, and such were the times in which he lived.

ROBERT LENDALL.

NOTE BY M. KHANIKOF
ON THE
IDENTIFICATION OF THE NAMES IN THE JOURNEY OF CLAVIJO TO SAMARCAND.

M. KHANIKOF has communicated to us the results of an examination, which he has kindly made at our request, of the names of places traversed by Clavijo during his journey to the court of Timour at Samarcand in 1403 A.D.* and which that old traveller gives in a very corrupt and Hispanicized form. M. Khanikof prefaces his list with some remarks on what he terms the *habitudes d l'oreille* of Clavijo, in transcribing names that were strange to him. He observes that in attempting to pronounce words in an unfamiliar language, one's ear involuntarily strives to give them a form borrowed from the language which is most familiar to us. Besides each of us, through the peculiarity of our auditory organs, perceives certain sounds more easily than others, and strives to introduce them in all the words pronounced. One easily detects these individual peculiarities when one hears an individual speak or read aloud, but when one has to deal with writings, it is only possible to discover these peculiarities of hearing by attentively examining the manner of transcribing strange words of which one knows the true pronunciation.

Clavijo often uses the letter X; but it is evident that he does not intend to apply to it the sound which it has in Spain, that is to say the sound of H in English, but that of Sh in English or of the letter *shin* in Arabic. Thus, at page 93 of Markham's translation of Clavijo, there is the following passage:—"Also there arrives all the silk that is made in the province of Xamahi." [*Otrosi viene la seda que se labra en tierra de Xamahi*†]. This evidently should be *Shamakhi*. Again, at page 99, "and the name of the place was Xahariprey" [*Eavia nombre Xahariprey*‡], which is very clearly *Shehri Rei;* as is correctly explained in a foot-note. At page 71 one reads:—"A cavalier, who was the son of a sister of Zaratan, named Xevali" [*Un cavallero fijo de una hermana de Zaratan que avia nombre Xevali*§], which is a Spanish transcription of the name *Sheikh Wali*. At page 79 is the passage, "inhabited by Moorish hermits called Caxixes" [*hermitanos Moros que Claman Caxixes*‖], which is a transcription of the word *Kishish*, a priest. In one place only does Clavijo replace the X by the Arabic letter *jim* or English J. At page 78 he says "On Saturday they passed the night in a town called Pagarrix" [*Otro dia sabado fueron dormir á una aldea que ha nombre Pagarrix*¶]. Now, this is certainly the town marked on the great map of Asia Minor by Kiepert, in latitude 39° 50′ N. and longitude 38° 10′ E. of Paris, under the name of *Pagaridsch;* which is written by Orientals *Pagarij*. These examples amply suffice to fix the sound which Clavijo gives to the X. But they also show that his ear frequently intercalated letters strange to the word, as where he introduces the letter *p* between *Shehri* and *Rei* (see *ante*). Occasionally, too, he suppresses a letter, as in the word *Sheikh Wali*, which he writes as if it was *Shevali* (see *ante*). With Clavijo the letter C, when it precedes A, has always the sound of K, except in a single instance, when he uses it as an aspirate in the word *Carras* (page 80 of translation, 102 of original), a great river, said to be near Ararat, certainly the Araxes, and not the Kur or Cyrus, which is very distant from Ararat. Before *ha*, *cha* forms the sound *tsha*. Before *u* the *c* again takes the sound *k*, as, for instance, at page 80,** *Calmarin* which is *Kamarlon*, a short distance from the ruins of Armasis,

* *Narrative of the Embassy of Ruy Gonzalez de Clavijo to the Court of Timour at Samarcand* A.D. 1403-6; translated for the first time, and edited, with notes, and a life of Timour, by Clements R. Markham, F.R.G.S. (Hakluyt Society, 1859.)

† Page 114 original. ‡ Page 119 orignal. § Page 93 original. ‖ Page 101 original. ¶ Page 100 original.

** Page 102 of original.

the ancient capital of Armenia, destroyed to make place for *Toktamysh*, which Clavijo calls here *Tetari*, but to which at the end he gives the real name. But he is mistaken as to the year of the invasion of the Tatars, which took place in 787 A.H. (1385 A.D.), eighteen or nineteen years before the journey of Clavijo, and not, as he says, "eight years ago." Fortunately Clavijo was not pedantic in his system of transcribing strange names, and, in writing his journal every day, he sometimes gives different forms to the same name, which enables us by comparing them, to make out the truth. I will only cite two examples. One is the name of the Oxus. At page 118, he called it *Viadme*, and at page 180 *Biamo*—which it is easy to recognize as *Abi-Amou*. Again, at page 150, he calls the grooms or postillions *Anchos*, and at page 180 *Anchias*. Evidently he has heard the Persian word *Tamtchi*, of which we make in Russian *Tamshtshik*, preserving the meaning of coachman. It is not the same with the word *Xagave*, which only occurs once, in the last line of page 184. According to him this word means "the guide of an ambassador who supplies him with all he requires." If the ear of the gallant old traveller did not retain the termination of the word which is *oul*, and which one often omits in speaking quickly, we may replace it instead of the final *e* in *Xagapul*. In the latter word one may easily recognize the title still used at the court of the Amir of Bokhara. *Shagavul* means an introducer and guide of an ambassador, an office equivalent to that of *Méhmandar* in Persia.

The following is the list of words given by Clavijo, with the rendering of M. Khanikof:—

CLAVIJO.	Page.	Line.	M. KHANIKOF.
Tagiguinia	1	12	The *Dzaganian* of Arab geographers, a country situated on the left bank of the Oxus, opposite to Balkh, to the South of Soghd, the present Khanate of Bokhara. Other geographers give it a wider extension, equal to that of ancient Bactria. Clavijo seems to take this view, for he says, at page 115, "This city (Anchoy) was beyond the land of Media, in a land called *Tagiguinia*."
Pixara	12	7	Os-ara.
Estalimen	24	17	Limus, in Italian Staleméne.
Xeten	27	19	Shahintkhtassy.
Redea	28	18	Eregli.
Trapea	50	9	Therapia.
Sequello	51	14	Selvi.
Pontoraquia	56	26	Rumli Fener of the Turks, Phanaraka of the modern Greeks, Heracleia Pontica; as suggested in the foot-note.
Espandiar	58-59	17-26	Isfendiar.
Leona	59	24	Cape Vona.
Guirisonda	60	1	Kerasunda.
Corila	60	6	Cape Géurélé.
Viopoli	60	8	Yavebolon.
Pexic	65	5	Pexit, of Kiepert's map.
Pilomasuca	65	14	Polima, of Kiepert's map.
Sigana	65	25	Ziganic, of Kiepert's map.
Alongogaza	68	4	Alanza, 39° 45′ N., 57° 12′ E., on the great map of the Caucasus, on the scale of 10 versts to the inch.
Zaratan	71	6	Mentioned under the name of Taherten, in the history of Tamerlane translated by Petis de la Croix, T. iv., ch. xliv. p 17.
Xevali	71	13	Sheikh Wali.
Pitalibet	72	20	Piralibek.
Xabega	78	8	Shabaghi.
Pagarrix	78	12	Pagaridsch 39° 50′ N. 38° 10′ E. of Paris.
Patir Juan	79	8	Padigman.
Auniqui	79	9	Janikeni
Ischu	79	12	Ascha.
Caxixes	,,	,,	Kishish.
Delularquente	79	15	Delilaba of modern maps.
Corras	80	2	Aroxa.
Naujua	80	5	A village near Kaghizman.
High Castle	80	11	Evidently the castle of Koulpa.
Calmarin	80	16	Kamarlou or Sourmali. Both are near the ruins of Armarir. But Sourmali is nearer the ruins of the ancient capital of Armenia.
Egida	81	30	Igdyr, on the Turkish frontier.
Vasit-calaside	82	29	Bayazid Calassi.
Macas	83	4	Makou.
Sorgart-mix	84	7	Sourghat-mish, a very common Monghol name.
Zanzan Miraxa	84	13	Hamzah Mirza.
Alinga	84	31	A little fort near the fortified village of Kizildza, on the road from Makou to Khoi, visited by M. Khanikof in 1855.
Caza	87	18	Village of Kizildza, but different from the above.
Cusacan	87	24	Kuzàh Kunan, a large village still existing.
Chauscad	87	30	Tshaoushkend, a large town still flourishing.
Zaydana	91	3	Seidanah or Seidabad, a town still existing.
Hujan	91	4	Oudjan, a village celebrated for its thermal springs and pastures.
Santguelana	91	6	Saguilaneh, a village in the environs of Turkmanchai.
Jacares	94	28	Djouher-perver. Nacre, mother-of-pearl.
Gansada	97	8	Khan-zadah, daughter of Aksoufi, of the tribe of Koungrad. Her first husband was Mirza Jehanghir.
Cequesana	97	22	Sheikh San'an.
Xaharcan	98	5	Shahrekan.
Perescote	101	20,27	Firouzkouh.
Vascal	103	29	Bastam.
Ennacora	103	30	Inakturéh, a title still used at Khiva.
Jagaro	104	28	Djoughr of the Arab geographers
Moles	106	14	*Mil*, a post.
Zabrain	107	6	The caravanserai of Zafrain, now in ruins.
Melialiorga	108	10	Melikaly Agha.
Ojajan	109	6	Ourta Khan, a town still existing.
Buelo	110	12	Bawerd, or Aliwerd.
Mirabozar	110	30	Miribazar. It is not, as Clavijo supposed, a name, but a title, still in use in Bokhara, for the head of the police in the markets and bazaars.
Hax	113	13	*Ash*, a plate. The Turkmen still pronounce it with a strong aspirate.
Salugar-sujassa	114	16	Salghàr-souioussy.
Anchoy	115	14	The town of Andkhoi.
Alibed	117	17	Aliabad. A village still existing in the district of Balkh.
Ux	117	19	Oush, a village near Balkh, not to be confounded with the town of the same name in Kokand.
Vaeq	117	21	Balkh.
Termit	119	19	Termad.
Mecer	129	23	Misr, a village colonised with Egyptians, by Timour.
Talicia	130	26	Telli-siah.
Calbet	130	27	Khalvet.
Tangus	134	13	Dongouz, Turkish for a pig.
Bayginar	136	15	Baghi-chenar, mentioned by Baber.
Bagino	138	26	Baghi-nou.
Tagaes	139	28	Tengeh.
Zalaparda	144	14	*Zerreh-peràéh*. A gilt shield.
Quenchicano	145	29	Kitshik-Khanúm.

CLAVIJO.	Page.	Line.	M. KHANIKOF.
Xamalique Mírza	146	19	Shah Malik Mírza.
Hansada	147	4,12,15	The same as *Ganzada*.
Tumanaga	155	34	The word is well written, but Clavijo has mistaken who was the wife most loved by Timour. She was the daughter of the Amîr Musa Tandjout.
Dileoltagua	156	1	Timour had two wives whose names began with *Dil*. These were Dilshad Agha and Dilkhush Agha.
Cholpamalaga	156	2	Tshulpan Agha.
Mundagasa	,,	,,	Munsudur Agha.
Vengaraga	,,	,,	Buran Agha.
Ropa-arbaraga	,,	,,	Rouh-pervor Agha.
Meri	170	22	*Miri*, a small coin.
Boyar	179	15	Evidently Bokhara.
Cabria	181	18	Kabrounia de Yakout.
Jagaro	,,	22	Djadjeron.
Vatami	182	27	Veramin.
Baxam Beg	183	1	Pasham Beg.
Assarec	190	29	Near Mianeh there is a place called Hissarek; but there may be another near Tabriz.

M. Khanikof expresses regret that the cartographers of the 17th and 18th centuries did not study the journey of Clavijo; which would have prevented many mistakes that did not disappear from our maps until after Rennel had discovered the itinerary of Forster.

THE LATE SIR JOHN RENNIE.

SIR JOHN RENNIE, C.E., Past-President of the Institution of Civil Engineers, was born August 30th, 1794. He first assisted his father, the late John Rennie, in building both Southwark and Waterloo Bridges. After the death of his father, in 1821, he succeeded him as engineer to the Admiralty, a post he held for ten years. Among his more important works are London Bridge, for which he received the honour of knighthood, Sheerness Dockyard, the completion of Ramsgate Harbour, and Plymouth Breakwater, commenced by his father, the Earl of Lonsdale's docks at Whitehaven, a portion of those of Cardiff, and the carrying out for a number of years of the great system of drainage and land reclamation in the Lincolnshire fens. He was also the author of a noble work on Harbours, and of a monograph on Plymouth Breakwater. In conjunction with his late brother G. Rennie, he contributed to introduce the screw propeller into the Navy, and erected the machinery for the mints of Calcutta, Bombay, and Mexico. They also erected the Royal Clarence Victualling Yard at Gosport, and Sir John Rennie was the first to perceive the uses of the diving bell in engineering works. Sir John Rennie was a high authority on all subjects connected with hydraulic engineering, harbours, canals, drainage, irrigation, the storage of water, and the management of rivers: and his pamphlets on the drainage of Lombardy procured him the order of St. Maurice and St. Lazare. Sir John possessed a wide reputation on the Continent as may be gathered from the fact that he constructed the harbour of Ponte Delgada, in the Azores, that he was a Knight of the Tower and Sword of Portugal, of the Wasa of Sweden, and was also a Member of the Academy of Science of Stockholm, and of the Austrian Society of Civil Engineers. Besides belonging to most of the scientific and learned societies in the metropolis, Sir John was long an active member of the Royal Society and the Meteorological Committee, and one of the Council, and was also chairman of the Juries at the Exhibition of 1862. Of late years, owing to age and increasing infirmities, he retired almost entirely from active life and public notice, and finally died September 3rd, 1874. His kindness of heart won him many friends, and while many will regret his loss, he will have left few enemies. Sir John Rennie was one of the original founders of the old Raleigh Travellers' Club, the forerunner of the Royal Geographical Society.

Reviews.

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ABOLITION OF THE COOLIE TRAFFIC AT MACÁU.*

ON the 20th of December 1873, a royal warrant, issued from the Office of the Portuguese Ministry for Marine, abolished contract emigration of Chinese colonists through the port of the City of Macáu.

This measure is due to the enlightened and philanthropic initiative of the present Minister for Foreign Affairs (and *ad interim* for Marine) in Portugal, the Councillor Andrade Corvo. It was the English press which was very properly the most assiduous in writing deserved eulogiums on this humane resolution of the Portuguese statesman. In Portugal the applause was not less general; and even the most violent of the organs of the party in opposition to that which now directs the affairs of the most faithful kingdom, accepted this measure of the Portuguese minister with decided favour.

Señor João de Andrade Corvo presented a report to the Legislative Session of the Cortes, assembled shortly after the publication of the above-mentioned warrant, in which he minutely studies the facts most directly allied to the coolie traffic, and fully enters into those causes which, while originating the traffic, proved at the same time to be most conducive to its development, and stamped it with the infamous and cruel character which rendered its prompt suppression necessary.

This document, remarkable for the loftiness of its reasoning, for the abundance and exactness of the information it supplies, for the sincerity of exposition and pureness of sentiment which dictate it, merits the best attention, for at least a few moments, of all those persons in the United Kingdom who were most solicitous for the abolition of that traffic, which from motives apart from the will, and foreign to the action of Government, became in Portugal (and it is this which is formally gathered from a perusal of the report) absolutely disgraceful. The Portuguese document is, however, totally unknown in England, the language in which it was necessarily written, to ensure its reaching its intended end, causing it to be but partially accessible to the English reader. It is not possible to reproduce it in its entirety, or even to give copious extracts; we, therefore, propose to endeavour to give our readers a general idea of its contents.

After briefly indicating the causes of the emigration in China, and attributing them less to the superabundance and consequent misery of the population than to the restless and enterprising spirit of the southern inhabitants of the Celestial Empire, and to their natural tendency to seek to improve their condition by labour and speculation; and after pointing out, in passing, the expansibility of the Chinese race, and giving some statistics on the successive progress of the stream of Chinese emigration since 1845, the report proceeds to mention the efforts made for a lengthened period by the English Government for the

* Relatorio e documentos sobre a abolição da emigração de Chinas contratados em Macáu, apresentado ás Cortes na Sessão Legislativa de 1874, pelo Ministro e Secretario d'Estado dos negocios da marinha e ultramar. Lisboa, 1874.

purpose of diverting those streams to its own sugar-producing colonies, with the object of removing, by the help of Asiatic labourers, that scarcity and considerably enhanced price of labour which was produced by the abolition of the slave trade.

These efforts, as might be expected, did not fail to produce a rapid increase in the emigration of coolies.

Even at this period, however, emigration was not unaccompanied by dangers to the expatriated coolies. Numerous facts prove that grave offences against humanity and justice were practised, and must have continued to be practised in the trade. "Such horrors, miseries, and atrocities of every kind, such horrible mortality, such acts of piracy and assassination have been associated with the transport of coolies to foreign regions, that common humanity will not permit us to remain indifferent to what is passing." So wrote, in 1852, Dr. Bowring, English Consul at Canton, to the Earl of Malmesbury. About a year later, "the Colonial Land and Emigration Commissioners," in a report, denounced the great irregularities and abuses committed in the coolie emigration traffic. The Portuguese Minister does the English Administration due justice in affirming that while encouraging this emigration, it sought to improve its conditions, and that, inspired with "a noble and elevated spirit of humanity," it endeavoured to bring to bear remedies, which, though always prompt, were not always efficacious. The report enumerates some of the English measures, such as an "Act for the Regulation of Chinese Passenger Ships," and the ordinance of the Governor of Hong Kong, in November 1857, which both arose from a resolution to diminish the abuses and defects in the emigration traffic. Notwithstanding these known abuses, the emigration continued on after 1857.

The criminal acts perpetrated by the brokers in order to obtain greater numbers of emigrants, succeeded each other with deplorable frequency. This resulted in the conflicts on board the coolie ships, and the attempts at revolt and arson by the deluded coolies, who were subjected to bad treatment on board, conveyed under the worst hygienic conditions, and allowed an altogether insufficient supply of food, which led to an excessive mortality. "The complaints against the way in which the coolies were treated in Cuba and in Peru were frequent, and gave rise on more than one occasion to international correspondence, and even to the temporary prohibition of the emigration to Peru, in English vessels. In spite of all these officially made complaints, the traffic continued to be maintained on a large scale." The intention of the Portuguese statesman to show that the emigration from Macáu was not the only traffic that was made infamous by heinous excesses, is evident. The emigration by contract, of coolies from Macáu, was begun there some years after it was established in other ports of China, to different tropical countries. The example was first set, in 1851, by two Frenchmen, and was directly followed by a Macáu man. The emigration once set on foot, numerous abuses soon manifested themselves in connection with it. Le Vicomte da Praia Grande, then Governor of Macáu, opposed it with the most energetic and humane measures. The Royal Warrant of the 12th of September 1853, which was the first act of the administration towards regulating this emigration, provided for the health of the colonists, and for the removal of the dangers from epidemics.

But emigration, spontaneous and natural, was not sufficient to satisfy the ever-increasing demand, and all kinds of devices were resorted to for the purpose of inveigling emigrants. Hence impostures and acts of violence, caused by the greed of the agents, increased daily. In November 1855 the Governor of Macáu published a special regulation, with the object of insuring the voluntary character of the emigration. This regulation did not have the desired effect. On the 5th of June 1856 another regulation limited the liberty of the emigration agents and brokers (the principal causes of these abuses), and imposed certain responsibilities on them. Three years later, an edict issued by the Government Council of Macáu censured the abuses introduced into the depôts of coolies, and applied the 1856 regulations to them in all their rigour.

The solicitude of the Portuguese Government to put an end to the innumerable abuses, which were becoming more and more deeply rooted, did not cease here.

Towards the end of 1857 the representatives of England and France, having met together in Canton, concerted fresh measures for the emigration traffic, with a view to making it more regular.

On the 30th of April, 1860, some new regulations, issued by the administration of Macáu, not only contained stipulations analogous to those of Canton, but even extended and improved them in many points. Besides other beneficial provisions, these regulations created a Chinese emigration superintendent. Even on the 12th of October, in the same year, the Governor of Macáu had made some further important and stringent rules respecting ships employed in conveying emigrants, and concerning emigration generally. At this time, and even at later periods, the coolie emigration was not generally looked upon as a criminal trade; and those nations who had the most lively interest in introducing their commerce, by more or less violent means into China, and in the breaking down of the traditional barriers set up by the Imperial Government against all communication with the "barbarians," did not forget to encourage the emigration of Chinese. In 1857 Lord Clarendon recommended the Earl of Elgin to endeavour to obtain from the Emperor of China a formal acknowledgment of the right of his vassals of both sexes and of all classes to quit their country. The "Tien Tsin" treaties obliged the Emperor to issue orders to the superior authorities of the empire to allow the Chinese liberty to embark in either English or French vessels, and to engage to serve as labourers in the colonies and other countries beyond the seas. The Portuguese Minister makes the causes clear that most tend to render the existing regulations ineffectual, and those same causes would operate similarly on any future regulations that might be issued. The emigration, both in its origin and ultimate purpose, will continue to remain out of the reach of the regulations and of the authorities, who watch over the engagements in the ports of embarkation, and endeavour to secure free liberty to all those who are engaged.

The abuses and outrages committed by the brokers increased continually; the catastrophes and crimes on board the ships conveying coolies were multiplied, and filled the world with horror. But in spite of all

this, public opinion was not then decided, and not definitely adverse to the coolie traffic. It was agreed that in the Pekin conventions—regulations should be introduced securing to the Chinese emigrant the necessary guarantees both for his physical and moral well-being. These regulations were agreed to by the representatives of England and France and Prince Kung on the 5th of March 1866. In the same year the Portuguese Government directed the governor of Macáu, Jose Marea da Ponte e Horta, to announce, at an opportune time, Portugal's determination of adhering to the convention.

Experience proving how useless were the provisions of these regulations, the same governor, on the 2nd of April 1868, named a commission for the purpose of making a fresh set of regulations that should provide more ample guarantees for inspection by the public authorities.

The suggestions of this commission gave rise to the regulations promulgated by the Governor Vice-Admiral Sergio de Souza, on the 24th of August of the same year, 1868. For reasons which would be too lengthy to recapitulate here, even these regulations did not correspond to the exigencies of the circumstances. Notwithstanding all the efforts and goodwill employed, the abuses increased to an enormous degree.

An understanding between the Portuguese and the Chinese authorities, and their combined action thereon, would perhaps have been the best means of diminishing those abuses, such action and the nature of it to be fixed by means of a treaty contracted between His Most Faithful Majesty's Government and the Chinese. Unfortunately, in spite of all the efforts used, no understanding was arrived at, and the convention or treaty though made was not afterwards ratified.

Fatal occurrences which happened during the transport of the coolies, caused the emigration by contract of Chinese, to become each time more and more odious.

In May 1871 the Governor of Macáu appointed a commission to propose such regulations as ought to be adopted to secure the liberty of the coolies, and measures were afterwards adopted conformably to the opinion of the commission. Following in the course begun, the Governor Viscount of S. Januario issued, on the 28th of May 1872, a set of regulations in which all those measures whose efficiency had been proved by experience were embodied. These regulations contained serious defects, but the Viscount of S. Januario modified them from time to time by subsequent measures, all of which tended to the improvement of the emigrant's lot.

The foregoing remarks briefly present the provisions adopted by the Portuguese Government for the purpose of stopping the inhuman practices existing in the coolie trade. They prove the sincerity of the efforts made by the Government of Portugal to stay this emigration, for which they have been more than sufficiently blamed. Public opinion in Europe and even in England did not always do justice either to these efforts or to the goodwill displayed by the Portuguese Government. In a despatch dated the 15th of April 1873, the Governor Viscount de S. Januario complained of the injustice of these opinions, and requested that recourse might be had to arbitration to prove that Portugal had always used the most energetic measures and exerted the most active watchfulness to prevent the frauds and excesses being practised. "The defect of this emigration," added the Viscount, "exists in its origin, that is, in the way in which the coolies were procured from places outside Macáu." The endeavours of the Portuguese Government to destroy the evil, at its root, were naturally futile in every way. This palpable fact did not cause the injustice to cease however. It certainly was not Portugal that was the greatest gainer by this emigration. The streams of emigrants went principally to enrich Spain, Peru, &c. Being largely carried on by means of foreign capital, the traffic most benefited foreign agents and companies. Portugal suffered in credit, however, by the continuance of this state of affairs, and at times was attacked by England with bitter and unjust censures. Seeing itself helpless to correct abuses which baffled the most stringent regulations, the Portuguese Government, supported by public opinion in Portugal, which condemned the traffic, because it considered the abuses which blackened it to be inseparable from it, resolved once and for ever to destroy it. The Royal Warrant of the 28th of December 1873 was brought out to put a final stop to the iniquities of the emigration. The report does not omit to record some of the most cruel and unpardonable facts, such as the cases of the 'Penelope,' of the 'Dolores Ugarte,' of the 'D. Juan,' &c. Impelled by high sentiments of humanity and justice, and confident of meeting corresponding sentiments in the Portuguese Government, the English Government instituted representations for the purpose of abolishing the emigration, and both the latter country and its officials sometimes did justice to the sincerity of the efforts of Portugal. The report points out in passing, the necessity for recording in an international convention the fundamental principles which should be followed with respect to emigrants, not only from Chinese, but from all countries, in order to secure them efficient liberty and protection.

Before concluding, the Portuguese document gives an exposition of the facts most clearly related to the economical and social state of Macáu, both before and after the warrant of the 20th of December. The conclusion gathered from this exposition is, that the true interests of Macáu were, while the emigration existed, sacrificed to an illusive prosperity. From the close study of these economical facts, the Minister proves that not only the highest interests of humanity, but even the material prosperity of Macáu, required that the Portuguese Government should abolish this traffic. The emigration by contract from Macáu, writes the Minister, was not a source of true prosperity, neither was it surrounded by consequences, either social or economical, that could even palliate it (to absolve it would be certainly impossible) owing to its deeply rooted and incurable vices and wickedness. It is plain that the existence of the traffic for a certain number of years created interests which to a limited extent were respectable, and also that the abolition of the trade will bring with it deplorable results to many families. The Portuguese Government, however, promises to use all the means at its disposal to alleviate the evils of this crisis. The last words contain an eloquent appeal to the sentiment of humanity in the Portuguese nation, which has always struggled to place the glory and honour of its name in advance of its interests. The report concludes with

these noble words:—"In abolishing emigration by contract from Macáu, the government firmly believes it has fulfilled a duty. The evil being once recognised as incurable, it became necessary to put a prompt and effectual stop to it. The traditions and honour of Portugal required this." Two points, we think, at least, are clearly established in the Portuguese report, viz., the sincerity and purity of intention of the Government of Portugal in destroying the abuses of the emigration, and its promptitude and firmness in suppressing it so soon as the facts proved the impossibility of divesting the trade of the excesses that stigmatised it.

DAS AREAL DER HOCH UND TIEFLANDSCHAFTEN EUROPAS. Von *G. A. von Kloeden*. 8vo., pp. 40. 2 maps. Berlin, 1873. (London: Trübner.)

DR. VON KLOEDEN has taken the trouble of computing the area of the lowlands and highlands of Europe, and as our ordinary handbooks are notoriously incorrect where areas are concerned (we forbear to quote instances), we consider it worth while to place before our readers the main results arrived at by the author. Europe, according to Dr. von Kloeden, is bounded towards the east by the Ural Mountains, the Ural River, the Caspian, and the crest of the Caucasus. He includes Candia, and other islands in the Greek Archipelago, but not Waigat Island, Novaya Zemlya, and Iceland. The total area of Europe within these limits amounts to 3,756,460 square statute miles, viz.:—

Continental Trunk	2,740,100	sq. miles.
Peninsulas	835,720	,,
Islands	180,640	,,

Of this area 2,419,950 square miles are supposed to consist of lowlands, and 1,336,510 square miles of highlands, distributed as follows:—

Continental Trunk	Lowlands	2,152,690	sq. miles.
	Highlands	587,410	,,
Peninsulas ...	Lowlands	194,430	,,
	Highlands	641,290	,,
Islands	Lowlands	72,830	,,
	Highlands	107,810	,,

It should, however, be stated that the distinction drawn by the author between highlands and lowlands (or, to give him the benefit of the original German expressions, *Hochland* and *Flachland*) is rather indefinite. He would have rendered a greater service to science had he computed the areas for certain zones of elevation, which would, however, have necessitated the construction of a hypsographical map of the whole of Europe, as that in Berghaus' *Physical Atlas*, besides being on too small a scale, requires thorough revision.

For further details, which are as comprehensive as the most ardent worshipper of figures can possibly desire, we must refer our readers to Dr. von Kloeden's interesting little volume, the value of which is enhanced by a hypsographical map of a large portion of Germany, and by another illustrating the nomenclature of the Alps.

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JAPAN; VIER VORTRAEGE VON EUFEMIA VON KUDRIAFFSKY. 8vo., pp. 202. Vienna, 1874. (London: Trübner.)

THESE lectures were delivered in November 1873, before the "Women's Industrial Society," of Vienna, and their author has done well to place them within the reach of the public at large. Intercourse with the members of the Japanese embassy at Vienna, a careful examination of the Japanese objects exhibited there last year, as well as the study of books, amongst which she particularises Siebold's great work and Mitford's *Tales of Old Japan*, have enabled Madame de Kudriaffsky to obtain a firm grasp of her subject. Her book throughout is full of interest, the information respecting the manners and customs of the people is particularly comprehensive, and a few hours of leisure could hardly be spent more pleasantly than in perusing the pages of this well-written volume.

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RUSSISCHE REVUE, MONATSSCHRIFT FÜR DIE KUNDE RUSSLANDS. *Herausgegeben von Carl Röttger*. IV. Band, 8vo., pp. 576. St. Petersburg, 1874. (London, Trübner & Co.)

THOSE happy times, when nearly every scientific writer in Russia availed himself of German or French, to make known the results of his labours to the outer world, are gone for ever. But whatever our regret may be at so many stores of knowledge being now closed to us in consequence of the almost general observance of a contrary practice, we have no right to complain. Russia is only now doing what other nations did when they abandoned Latin in favour of their native languages, and as Russian is spoken by some seventy millions of human beings, who are slowly but surely advancing to a stage of civilization which will place them on a par with other European nations, there will be no lack of readers for books printed in the vernacular tongue. Yet, it is this very advance which renders information on what is doing amongst such a multitude doubly interesting, and as a knowledge of Russian is possessed only by a few, works, such as that the title of which is given above, and written in a language more generally understood, are deserving of encouragement and support.

The *Russische Revue* is an ably edited monthly magazine, abounding in carefully written articles on the history, the social and material condition, and the geography of the Russian empire: it supplies us with a bibliography, and keeps us *au courant* of the principal events affecting its welfare. Geographical papers form one of its leading features, and amongst those contained in vol. iv., Dr. E. Schmidt's exhaustive and conscientious account of the expedition against Khiva is particularly valuable, and would well repay translation. Amongst other papers of a geographical and statistical nature we may mention Khun's report on a journey through Khiva (1873); Dr. Grimm's Impressions of a medical man during the Khiva campaign; Bock's article on Russian coal-mining; Matthäi's paper on the foreign trade of Russia; Schwanebach's essay on the new municipal laws; Grünwaldt's essay on Trade Societies; a geological sketch of the Crimea; and a paper on the hill tribes of the Caucasus.

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STATISTISCHE UND ANDERE WISSENCHAFTLICHE MITTHEILUNGEN AUS RUSSLAND. 7r. Jahrgang, 8vo., pp. 174. St. Petersburg, 1874.

THE *Statistische Mittheilungen* are reprinted from the St. Petersburg *Kalender* for 1874, and may be likened to the "companion" to the British Almanac, though far less varied in their contents. The present number brings information on the area and population of the empire, a list of towns with their population and distance from the two capitals, a popular paper on the transit of Venus, a profusely laudatory article on Catharine II. and her monument, a very valuable account of the development of the Russian mining industry from 1860 to 1871, and an annotated translation of the Russian law on Bills of Exchange. If amplified into a statistical year-book these *Mittheilungen* would gain much in interest.

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COOK'S Tourists' Handbook to Switzerland, *vid* Paris. 12mo., pp. 210. London, 1874. 2s. 6d.

GLARNO (S. W.) Reisetaschenbuch für Schweizer-Touristen. 16mo., pp., 260. Map. Constanz, 1874. 2s.

DIE Gletscher der Schweiz nach Gebieten u. Gruppen geordnet (Les glaciers de la Suisse rangés par régions et par groupes). Auszug aus d. Gletscherbuche des schweiz. Alpenclubs. 8vo., pp. 112. Luzern, 1874. 3s.

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BELGIUM.

CONTY, Spa en poche. Bains et eaux minérales, plaisirs et promenades, &c. Map and illustrations. 18mo., pp. 72. Paris, 1874.

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GOLDSMID (Col. Sir F. J.) Telegraph and Travel: a narrative of the formation and development of telegraphic communications between England and India, with notices of the countries traversed by the Line. Maps and illustrations. 8vo., pp. 688. London, 1874. 21s.

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LOEHNIS (H.) Drei Monate im Orient, 1874. 8vo., pp. 310. Map. London, 1874. 9s.

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Cartography.

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The Ordnance Survey in 1873.

THE report lately issued by General Sir Henry James enables us to form some idea of the progress of the great national survey, which employs a well-trained body of 20 officers of Royal Engineers, 122 non-commissioned officers, 243 sappers, 1000 civil assistants, and 477 labourers, whose united salaries amount to no less than 111,393*l.* a year.

During the past year an area of 1745 square miles was surveyed in England and Wales, and one of 2118 square miles in Scotland. The total area now completed in the former amounts to 24,877 square miles, that in the latter to 27,829 square miles, and if the present rate of progress is maintained for ten years longer, we shall then be in possession of a map of the entire country which will surpass in minute accuracy that of any other country of equal extent. The surveying operations in England were carried on in Essex, Sussex, Wilts, Derbyshire, Cheshire, Shropshire, Denbighshire and Glamorganshire. In Scotland the survey of the mainland was completed during last year, and the western part of Ross-shire, including the most mountainous part of the highlands, has now been mapped correctly for the first time. The surveying parties are now at work on Skye and Mull, and if the seasons prove favourable, the survey of the entire kingdom will be completed in the course of next year. In Ireland, the revision of the six-inch map was proceeded with in the counties of Carlow and Westmeath, plans of several towns were prepared, the tenement boundaries laid down on 451 six-inch maps for the Valuation Department, and 102 glebes surveyed for the Irish Church Temporalities Commissioners.

Looking to the minuteness with which the surveys are made, the progress recorded above leaves no room for dissatisfaction. Unfortunately, the rate of publication is very much slower. The areas for which parish plans on a scale of 1 : 2500 and six-inch maps were published in the course of 1873, and the state of these publications at the close of the year, may be gathered from the following table :—

		Area published during 1873.	Total Area published on Dec. 31, 1873.
England & Wales	Parish Plans	838	10,601 sq. m.
	6-inch Map	411	16,260 ,,
Scotland . . .	Parish Plans	518	10,612 ,,
	6-inch Map	1154	18,240 ,,

In addition to these there were published fifty-eight sheets of the detailed map of London on the 5-feet scale, eight sheets of the same map on the 1 : 2500 scale, plans of Ashford, Basingstoke, Deal, Folkestone, Macclesfield, Ramsgate, Rhye, Romford, Sandwich, Watford, Winchester, Wokingham, Galway, and Londonderry on a scale of 10 feet to the mile (1 : 500), and of Limerick on half that scale.

The publication of the one-inch map, in which the general public, after all, take most interest, is proceeding far more slowly than could be desired. Sir Henry James explains the delay by referring to the large number of engravers who were employed upon the plan of London, now happily near its completion, and promises to clear away arrears as soon as these engravers shall be set free. This, indeed, is much to be desired, for on referring to the index maps illustrating the progress of work, which are appended to the report, we find that, whilst the existing surveys suffice for filling up 216 complete sheets of the one-inch maps of England (new series) and Scotland, only 150 sheets have been engraved, and of this latter number only 123 are published with the hills. There are thus no less than 66 sheets which might be nearly ready for publication, but have hardly as yet been touched by the engraver. The delay in the publication of the six-inch maps is equally great, for though 52,706 square miles have been surveyed in Great Britain, the published maps only cover an area of 34,500. This indeed is a serious matter, for the maps necessarily lose in value if published years after the survey has been completed. Looking to these arrears we cannot help advising the Ordnance Office to follow the example of the Indian Survey Office, which produces most of its maps by photo-zincography, for although these maps are not equal as regards technical execution to the beautifully engraved sheets of the Ordnance Survey, this drawback is more than compensated for by the rapidity with which the result of the survey is brought before the public. Sir Henry James would be entitled to the thanks of everyone interested in the survey so successfully carried on under his directions, were he to cause preliminary copies of all the sheets of the one-inch map, the drawing of which has been completed, to be issued.

We venture likewise to suggest that a more general application of photo-zincography to the production of the six-inch and other large scale maps might set free a number of artists, whose services would enable him to push on more rapidly the engraving of the one-inch map.

The new sheets of the map of England (new series) are equal in all respects to the sheets of the northern counties published some years past. In the course of the last two years, the engraving of the following sheets was completed with names and contours, viz., 271, 272, 285, 330, 331, 344 and 345. They delineate portions of Surrey, Kent and Hampshire, and the four sheets named last form an excellent map of the Isle of Wight. Sheet 66 of Scotland has been published with hills, and sheets 62 and 63 in outline, with contours. The latter contain the celebrated parallel roads of Glen Roy; the former embraces the greater portion of Kincardineshire, and, as a specimen of hill etching, leaves little to be desired. Seven sheets with hills (34, 65, 66, 74, 79, 82 and 84) have been added to the one-inch map of Ireland.

It is needless to say a word in commendation of the Ordnance Maps, for their correctness and beautiful execution are universally acknowledged. Their utility (we refer here specially to the so-called cadastral plans) will only become fully apparent when our legislators shall have learnt to avail themselves of the facilities they place at their command in everything referring to the transfer or taxation of land.

In addition to producing the maps referred to above, the Ordnance Survey, in the course of last year, prepared a number of maps and plans for the use of the War Office, Admiralty, and the Local Government Boards, supplied the Census Commissioners with areas, engraved the maps required by the Geological Survey, published facsimiles of national manuscripts in photo-zincography, and 5229 photographic views of Jerusalem and Mount Sinai.

Sir Henry James likewise computed the mean height of five Scotch counties, which the contoured 6-inch map enabled him to do with a considerable amount of accuracy. His results are as follows :—

Aberdeen	875 feet
Kincardine	530 ,,
Forfar	856 ,,
Perth and Clackmannan . . .	1144 ,,
Banffshire	965 ,,

The comparison of standards of length was continued at Southampton, the countries concerned having obligingly forwarded their standards to this country to be compared with our standard yard. The principal results obtained were as follows :—

Measure	Inches.	Millimetres.
The Yard	36.000000	914.39179
Ordnance Standard Foot . .	11.999982	304.79681
Indian Standard Foot . . .	12.000100	304.79980
Indian 10-ft. Bar Is . . .	120.002450	3048.03488
Australian 10-ft. Bar OI4 . .	119.998954	3047.94608

Measure.	Inches.	Millimetres.
Cape of Good Hope 10-ft. standard	119.998298	3047.92941
The Metre	39.370432	1000.00000
Ordnance Metre	39.374928	1000.11420
American Metre, No. 6	39.369459	999.97527
Spanish Four Metre Bar	157.497682	4000.40522
The Toise	76.734402	1949.03632
Ordnance Toise	76.739925	1949.17660
Prussian Toise, No. 10.	76.734328	1949.03444
The Klafter	74.665254	1896.48043
Ordnance Half Klafter	37.329737	948.16681
Milan Copy of Klafter (I. 3)	74.664528	1896.46195
" " " (I. 11)	74.665076	1896.47592

In conclusion, it may interest some of our readers to know that the public can now procure their ordnance maps at an office specially opened for that purpose at 1, St. Martin's Place, and that 7944*l.* were realized during the year from the sale of the maps. If we consider that a single copy of the large map of London costs 82*l.*, and a set of the one-inch maps, as far as published, about 32*l.*, the sales can hardly be called satisfactory. We do not venture to affirm that they would be larger if the price of the one-inch maps were to be reduced by one-half, but in the interest of spreading a taste for well-executed maps amongst the public at large, we should like to see that measure tried. We believe, too, that more success in the sale of the maps might be achieved if the Ordnance Office condescended to avail itself of those means of obtaining publicity which every ordinary tradesman resorts to. Above all, there ought to be a concise catalogue of those maps which may be supposed to be of general interest, and this catalogue ought to be distributed gratuitously, as is done by every private publisher. Moreover, the allowances made to the trade ought to conform to the scale universally adopted throughout the country.

The Alpine Club Map of Switzerland.*

IN 1864 the Alpine Club resolved, on the motion of Mr. R. Macdonald, that a map of Switzerland should be published with special reference to the wants of pedestrians, and the outcome of this resolution is now before us in a beautifully engraved four-sheet map of the most interesting portion of the European Alps. The committee appointed to carry out the intentions of the Club, consisted of Messrs. Leslie Stephen, W. E. Hall, A. Adams-Reilly, F. E. Blackstone, W. Longman, A. W. Moore, E. Whymper, T. Blandford, J. J. Cowell, A. Rivington, and R. C. Nicholls, upon the last of whom devolved the task of arranging and editing the map. The drawing and engraving were undertaken, in the first instance, by the late Dr. Keith Johnston, to whom we are indebted for the north-western and a portion of the north-eastern sheet, but was subsequently entrusted to Mr. Stanford. Both these gentlemen are deserving of commendation for the conscientious care which they have brought to bear upon their task. The progress of the map has been exceedingly slow, even if we take into account the elaborate manner in which the hills are shaded, and we think the Committee of the Club has done wisely in issuing it to the public, although the hill shading on the south-eastern sheet has not yet been completed.

The map, as far as Switzerland is concerned, is based upon General Dufour's beautiful staff map of that country, the character of which is strikingly reflected by it in the delineation of the ground. The adjoining portions of non-Swiss territory are generally based upon official maps. It is curious, though, that the completion of the Government maps of Baden and Würtemberg should have remained unknown to the authors, who were content to derive their information second-hand from Reymann's Map of Central Europe. The Tyrol is still based upon the old Austrian Staff map, which is acknowledged to be full of errors. The Adamello and Ortler groups, however, are taken from Captain Payer's admirable surveys, but more pains might have been taken to bring this portion of the map up to date, especially as respects altitudes, even though it should have been found impossible to gain access to the new contoured survey of the Tyrol, which was begun in 1869, and is already far advanced towards completion. The old Sardinian surveys of Piedmont and Savoy are notoriously defective, and it is gratifying to find that the authors have taken unusual pains to render this portion of their map as correct as possible. Mr. Reilly's original maps of the south side of Monte Rosa, of the Val Pelline and of Mont Blanc, the latest French maps (including the unpublished sheets of the new survey of Savoy, which were kindly placed at the service of the club by the Director of the Dépôt de la Guerre), and Mr. Nichols' laborious examination of the group of the Grand Paradis and neighbouring mountain regions rendered it possible to improve considerably upon existing maps. The extent to which these improvements has been carried may be perceived if we compare the map before us with one of older date, as, for instance, that in Mayr's *Atlas of the Alps* (Edition of 1871).

Had the members of the Alpine Club known that at the very time they were planning the publication of their map, the Swiss Staff Office had already taken in hand a map on the same scale, which has since been published,* they would probably not have assented to Mr. Macdonald's motion. To many it may appear a matter for regret that so much labour should have been bestowed upon the production of two maps of the same country, both drawn on the same scale. Yet, on comparing the maps, sufficient justification may be found for their independent existence, for whilst the Swiss map is distinguished by a bold and vigorous treatment, that of the Alpine Club excels in detail, and possesses the additional advantage of embracing the whole of Savoy, and a considerable portion of Piedmont, with that goal of so many Alpine travellers, Mont Blanc. The minuteness of the map may possibly prove a stumbling block to many, for even a person having good eyes may find himself compelled occasionally to resort to the use of a glass in order to make out the course of some of the less strongly marked mountain paths. The amount of detail given is, however, considered to be absolutely necessary if the map is to prove of real service to the pedestrian, and the Committee of Alpine Climbers appointed by the club to superintend its execution may be accepted as qualified judges in that respect. Greater clearness might no doubt have been secured by choosing a larger scale, but the map would then have been more cumbrous and inconvenient to carry.

The map, in addition to railways, distinguishes five kinds of roads and paths, indicates bridges and ferries, churches and monasteries, castles, ruins, points of view, battle-fields, landing-places, baths, inns in remote localities, and fortifications. It gives, likewise, the names of Roman stations, the sites of lake-dwellings, and of remarkable discoveries of the stone, bronze, iron, and Roman ages. The altitudes are indicated in feet, and the glaciers tinted blue.

There is no doubt that in a work of this kind there should occur many minor errors, and we trust travellers using the map will heartily respond to the invitation of the editor, and communicate with him whenever errors or omissions are discovered by them.

E. G. RAVENSTEIN.

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* The Alpine Club Map of Switzerland, with parts of the Neighbouring Countries, edited by R. C. Nichols, F.S.A., F.R.G.S., under the superintendence of a Committee of the Alpine Club. Scale 1 : 250,000. 4 sheets. London, 1874. Price, in portfolio, 42s.; single sheets, mounted in case, 15s.

* *Ocean Highways*, 1873, p. 210.

A New Map of Central Asia.*

THE following notice on a new map of Central Asia has been forwarded to us by an esteemed correspondent at Pesth. We may possibly recur to the subject when we shall have had an opportunity of personally examining the map.

"Considering that the Austro-Hungarian Government has neither a political nor a commercial interest in Central Asia, we may look upon it as a proof of true love for science that it has not spared expense in publishing a map of Central Asia, such as the one before us, compiled by the Royal Imperial Military Geographical Institute of Vienna, from the most recent and best Anglo-Russian sources. This (on a scale of 1:3,024,000) consists of twelve detached sheets, No. 1 beginning at Saratof, whilst No. 12 ends with Ganjam, in Eastern Hindustan. We find embodied under the general name of Central Asia a good portion of South Russia and Siberia, of the Caucasus and of the western portion of the Ottoman Empire, as well as of India, Kashmir, and of the surrounding countries. This arrangement may be entirely justified, considering the multifarious interests by which the border countries are connected with the properly called Central Asia—the geographical denomination for Afghanistan, the three Khanates, the recent acquisition of Russia, and the dominion of Amîr Yakub Khan. The German reader may congratulate himself on having got a map to consult, with reference to occurrences, in books as well as in newspapers, referring to Central Asian matters. The chief basis of the map before us was evidently the Russian map published by the Imperial Topographical Institute of St. Petersburg two years ago; but we are glad to miss all the shortcomings of the later one, as the Viennese geographers endeavoured, with partial success, to avail themselves of all recently made discoveries and accessible sources. Thus we find upon sheet 4 the military road laid down by General Lamakin on his way from Kindirly Bay to Kungrat, together with the results of sundry excursions undertaken by Stebnitzki and Radde eastwards of the Balkan to investigate the course of the ancient bed of the Oxus, as well as a few of the prominent rectifications made during the Khiva campaign. The same can be said of sheet 5, where an accurate delineation of the Kara-Tau, with its north-eastern and southern spurs, will be found. Here we miss the fictitious chain of mountains running across the Pamir, and we find a tolerably good sketch of the Alai, after the researches of the late M. Fedchenko. It is a pity, however, that the Bukan-Tau, an important place during the last Russian campaign—although not wanting on the map—has not been made somewhat more prominent. Upon sheet 6 there are still missing the recent discoveries of the English explorers in Eastern Turkistan, although the works of Johnson, Hayward, and Shaw have been partly made use of; but here we find already Kulja incorporated in the Russian possessions—what the St. Petersburg map neglected to do. Many other similar advantages may be noticed in the new cartographical production of the Austro-Hungarian Geographical Institute of Vienna, and if we add that the lithographic work is admirable, as well as that the transcription of proper names is much more correct than upon all previous German and non-German maps of Central Asia, we have said enough in praise of Major-General von Dobner, the able and learned Director of the said Institute.

"V——Y."

* General Karte von Central Asien, bearbeitet nach den besten neuesten Englischen und Russischen Quellen im K. K. Militärisch Geographischen Institute im Wien. 1873.

New Maps.

Kuyper (J.) Atlas der natuurkundige aardrijksbeschrijving (Atlas of Physical Geography). 4to., 16 maps. Gorinchem, 1874. 10s.

Thomson (A.) Atlas of Scripture Geography. 16 maps and letter-press. 12mo., pp. 128. London, 1874. 1s. 6d.

La France en chemin de fer (maps of the six French railways and of each department, showing principal places, roads, railways, rivers, &c.). 8vo., 94 maps. Sceaux and Paris, 1874.

Erhard. Réseau des voies navigables de la France (Navigable Rivers and Canals). Paris, 1874.

Méa (P.) Atlas topographique, agricole, et géologique du département de la Corrèze (Topogr. agricultural and geological Atlas of Corrèze). Publishing in parts. Paris, 1874.

Croquis des routes et chemins de la rive gauche du Rhône à l'échelle de 1,40,000. Lyon, 1874.

Croquis des routes et chemins sur la rive droite de la Saône au nord-ouest de Lyon. 1:40,000. Lyon.

Croquis des terrains compris entre le Rhône et la Saône, 1:40,000. Lyon, 1874.

Erhard Pyrénees-Orientales. Paris, 1874.

Walton. Pyrénées centrales. Carte locale No. 2. (Capvern Bagnères-de-Bigorre and environs.) Paris, 1874.

Erhard, Nouveau plan complet de la forêt de Compiègne (new map of the Forest of Compiègne, with all the changes made during several years past.) Paris, 1874.

Mongy, Plan de la ville de Lille agrandie de la banliene et des comnunes limitrophes. Paris, 1874.

Plan de la ville d'Angers. Angers, 1874.

Guillaud (Ch.) Plan général de la ville de Tours. Tours, 1874.

Bonnamas (L.) Dijon. Plan d'ensemble. 1:5000. Paris, 1874.

Prussia. General Staff Map (1:100,000). Section 86. (Allenstein.) Berlin, 1874. 1s.

Geologische Karte von Preussen. (Geological Map of Prussia and Thuringia, published by the Prussian Board of Trade.) Scale 1:25,000. Part 5. (Sheets 245, 246, 263.) With notes. Berlin, 1874. 6s.

Karte des Steinkohlenfelder des Niedererzgeb. Kohlenbeckens (Map of the Coal-fields of the lower Erzgebirge, prepared by Mining Officials). 4 sheets and letter-press. Zwickau, 1874. 12s.

Benecke (Dr. E. W.) u. Cohen (Dr. E. C.) Geognostische Karte der Umgegend von Heidelberg. (Geological Map of the environs of Heidelberg, sheet II., Sinsheim.) Strassburg, 1874. 6s.

Schultz. Plan der Stadt Strassburg, 1:5000. Strassburg, 1874. 1s.

Plan der Stadt Wien. (Plan of Vienna and suburbs, from official sources.) Scale 1:5760. 6 sheets. Vienna (Gerold), 1874. 15s.

Situations plan von Karlsbad. (Plan of Karlsbad and environs.) Karlsbad, 1874. 9d.

Benstetten (Baron). Carte archéologique du canton de Vaud. (Archæological Map of Vaud, with 56 pages of explanatory notes.) Toulon, 1874.

Waterstaatskaart van Nederland (Hydrogr. Map of the Netherlands). 1:50,000. Section sneek 1 to 4. The Hague, 1874. 2s. 6d.

Kaart van Gelderland (map of Gelderland, prepared under the superintendence of Dr. F. G. B. van Bleeck, van Rijsewijk). 6 sheets. Arnhem, 1874. 6s. 8d. in sheets, 20s. mounted on rollers.

Braakensiek (A.) Nieuwe Plattegrond van Amsterdam (Plan of Amsterdam). 1 sheet, folio. Amsterdam, 1874. 1s.

Schiaparelli (C.) et E. Mayr. Nuova carta generale del regno d'Italia. (New map of Italy showing political boundaries; for school use.) Scale 1:920.000. 4th ed. 9 sheets. Gotha, 1874. 10s.

Vuillemin (A.) Bassins du Pô et de l'Adige. Paris, 1874.

Malte-Brun (V. A.) Carte de la nouvelle Calédonie et de ses dépendences, avec la Colonie de l'île Nou, d'après la carte de Bouquet de la Grye et des documents officiels. (Map of New Caledonia and its dependencies.) Paris, 1874.

Map showing the Mineral resources of Chattanooga and vicinity. 31 inches by 26. New York, 1874. 25s.

Niox (Capt.) Carte du Mexique, dressée au dépôt de la Guerre. 2 sheets. Paris, 1874.

Albear y Lara (Colonel F. de). Habana (Plan of Havana, surveyed by order of the Government). 2 sheets. Paris, 1874.

Log Book.

—:o:—

The Arctic Meeting.—At the meeting of the Royal Geographical Society to receive Lieutenant Payer, on Tuesday, November the 10th, His Royal Highness the Duke of Edinburgh and His Imperial Highness the Czarewitch intends to be present. Lieutenant Payer will be entertained at dinner by the Trinity House on November the 4th.

New Austrian Polar Expeditions.—The success attained by the late Austrian Polar Expedition under Weyprecht and Payer, has kindled the enthusiasm of their countrymen. Offers of support are flowing in from all quarters, and the simultaneous equipment of two expeditions appears to be secured. Captain Payer will be afforded an opportunity of practically testing his opinion that sledge expeditions offer the best chances of success to an expedition desirous of reaching the North Pole. He will land on the east coast of Greenland, the scene of his first explorations, and will then endeavour to push as far north as possible. Count Wilczek, one of the most generous supporters of the late expedition, intends to proceed by ship to New Siberia, thence to make his way to Cape Chelyuskin, the northernmost point of Asia, and finally to penetrate the Arctic in boats. He expects to be able to reach the land supposed by Middendorf to exist in that direction, or, at all events, to determine the eastern termination of Franz-Joseph Land. Both expeditions will be accompanied by men of science.

Drift of the Arctic Ice in 1874.—Captain David Gray, of Peterhead, reports a great and unusual southerly drift of the ice in the Spitzbergen Sea. In May, June, July, and August, its average drift was fully 14 miles a day. In March and April it must have been driving at double that rate. In August Captain Gray was in 79° 45′ N., and found the ice all broken up, whereas in 77° the floes were lying whole and unbroken, showing that the ice further north must have been broken by a swell from the north. There was a dark water sky beyond the pack which stopped Captain Gray, in 79° 45′, and open water to the horizon. Mr. Rickaby, who went on a sporting trip to Spitzbergen, in Mr. Leigh Smith's yacht, the 'Sampson,' reports heavy ice pressed close upon the northern shores, which also points to an unusually strong southerly drift.

Belknap's Deep Sea Soundings in the Pacific.—Preliminary reports have been received by the United States Navy Department from Commander Geo. E. Belknap, who is charged with ascertaining a practicable route for laying a telegraphic cable between Puget Sound and Japan. The reports detail operations carried on between the 9th of June and 28th of July 1874, and are of great interest as they confirm the great depth of the Pacific, and exhibit the powerful action of submarine currents. Commander Belknap proposed to sound homeward on a great circle having its initial point at Kingwasan (Sendai Bay) on the eastern shore of Nippon, and passing through Tanaga, one of the Aleutian Islands. At a distance of 70 miles from Kingwasan the lead sunk to a depth of 1833 fathoms, 30 miles further it sunk to 3427 fathoms, showing a descent of 1594 fathoms in so short a run. At the next cast (145 miles from the starting point) the sinker carried the wire down to a depth of 4643 fathoms without reaching the bottom. When some 500 fathoms of wire had run out the sinker was suddenly swept under the ship's bottom by a strong undercurrent, and all efforts to get the wire clear and keep it from tending underneath were unavailing. The strain upon the reel was very great, and was due, in Commander Belknap's opinion, to the action of a strong undercurrent upon the sinker, which swept it with great force from the ship. The effect of such a current upon a bight of 6 to 7 miles of telegraphic cable would be almost incalculable, and render the process of laying it next to impossible. It was determined, therefore, to give up this track, and to begin a new great circle off Point Komoto, in latitude 40° N. Here, likewise, at a short distance from the land, and as soon as the edge of the Japan stream is crossed, the water deepens rapidly. Casts were made at intervals of 40 miles. The depth of the ocean, at a distance of 120 miles from the initial point, was found to be 3493 fathoms; at 160 miles it was 3587; at 200 miles, 3507; at 240 miles, 4340; at 400 miles, 4,120; at 440 miles, 4411; and at 480 miles, 4655 fathoms. A good specimen of bottom soil was brought up from a depth of 4340 fathoms; but Miller's Casella thermometer came up a perfect wreck, though it successfully withstood the enormous pressure at a depth of 3507 fathoms. On the occasion of the two last casts, the wire was lost, and finding the water to be deepening all the while, and not being able to afford further losses of wire, Commander Belknap resolved to run inshore, and sound back along the coasts of the Kurile Islands * to Point Komoto, then skirt the rest of these islands and the coast of Kamchatka, as far as Cape Shipunski, and finally cross over to the Aleutian Group. The ocean bed along the route thus traced out was found to be very irregular, and the water deepens rapidly the moment the land is left. At a distance of 110 miles (E. by S. ?) from Cape Lopatka, the southern extremity of Kamchatka, the greatest depth (3754 fathoms) was sounded. The sea-bottom, between Kamchatka and the Aleutian Islands forms a ridge, the highest part of which is 1777 fathoms below the surface, and due south of the Commodore's Islands. But further east, 80 miles to the east by south of Agattu, the great and unlooked for depth of 4037 fathoms was found, though 30 miles further on the lead indicated a depth of 2763 fathoms only. On the 19th July Commander Belknap entered the Glory of Russia Bay, in Tanaga, which he examined with a view of ascertaining its suitability of landing a cable, and then proceeded to Unalashka for a supply of coal.

German Expedition to Persia.—We hear that the German Government has resolved to supplement their Transit Observation party at Isfahan by a geographical and archæological expedition in the lesser known districts of Persia. Dr. Andreas of Berlin, accompanied by an assistant-surveyor and a photographer, will be in charge of the party, whose labours, it is believed, will extend over three years. We recommend as a field for summer work the country between the main road from Bushire to Shiráz and the

* Dense columns of smoke were seen to rise out of a crater at the eastern end of Urup.

Turko-Persian frontier; and for winter, Laristán and the other districts on the west of the gulf, of which little but conjectural maps exist on the whole extent from Bandar-Abbas to Bushire.

The Insurrection in Khokand. — Contentions between the nomadic Kipchaks and Kara Kirgiz and the Sarts or Tajiks have repeatedly disturbed the peace of Khokand. In 1841 the Kipchaks raised Shir Ali on the throne, but he was deposed by Musulman Kul, his prime minister, in 1843, and his son, Khuduyar, the present khan, at that time only sixteen years of age, was placed in his stead. Khuduyar, though a Kara Kirgiz by descent, sided with the Sarts when they rose in rebellion a few years afterwards. The rebellion was suppressed, but Musulman Kul allowed the khan to retain his throne, an act of forbearance which did not prevent the young sovereign from conspiring to take away his minister's life. Musulman Kul succeeded in escaping amongst his friends, but his hastily gathered adherents were beaten at Ikis, near the confluence of Naryn and Syr Daria, and he, with 10,000 Kipchaks, was beheaded. This happened in 1849. The bloody act of repression cowed the Turks, and the Sarts were allowed to remain in power until 1857, when Mollah Khan, a brother of Khuduyar, placed himself at the head of the discontented party, and forced Khuduyar to seek refuge in Tashkent, where he was still recognised as sovereign. Mollah Khan's reign, however, was but of short duration, for, in 1859, he fell under the hands of an assassin, and Alim Kul, his prime minister, ascended the throne. Khuduyar, though aided by Bokhara, vainly endeavoured to regain his lost power, and, as recently as 1863, an entire army of Bokharese was held in check by a handful of Kipchaks, ensconced in the pass of Kara Kulja, near Uzkent. One of the most important acts of Alim Kul's reign was the despatch of a body of troops in aid of the Muhammadans of Kashgar, who had risen against the Chinese. Yakub Beg, the leader of these troops, is the present ruler of Jityshahr.

The appearance of Russia upon the scene of action, changed the course of events. Alim Kul fell in the battle fought under the walls of Tashkent, in 1864, and a portion of his subjects, tired of bloodshed, recalled their former ruler, Khuduyar. Others left the country, and joined Yakub Beg in Kashgar. Khuduyar's first care was to come to terms with the Russians, who already held Khojent, and were within a few days' march of his capital. He succeeded in this, though not without sacrificing much territory, through the good offices of Mirza Khakim Bey, a wealthy merchant, who had learnt to appreciate the power of Russia during a visit to the fair of Nishni Novgorod. A treaty of peace and amity was concluded in 1868, and for several years the relations between the two countries were tolerably satisfactory. Khokand enjoyed several years of peace, and even Abu Rakhim (Abdurahman), the son of the unfortunate Mussulman Kul, lived quietly at the court of his father's murderer. But in 1873 the slumbering enmity of the nomadic tribes was aroused by a tax imposed upon the fruit trees growing wild in the forests. Khan Saidi (Nassyr Eddin Bey), the khan's son, suppressed an attempted rising with ferocious severity, and Khuduyar, on pretence of making amends for his son's harshness, enticed forty Kipchak notables to his court, where he caused them to be assassinated. This act of treachery roused the Kipchaks and Kara Kirgiz into rebellion. They offered to become Russian subjects, but their offer was rejected. They then applied to Yakub Beg, of Kashgar, whom many of them looked upon as their natural chief; but that ruler does not appear to have seriously entertained their advances, though he placed no obstacle in the way of several bands who crossed the frontiers of his territory with a view of assisting the rebels. These latter do not appear to be making much progress; a report has even reached us that a body of them were compelled to seek refuge on Russian territory, where they were disarmed. But they have evidently caused much anxiety to Khuduyar, who has inaugurated a reign of terror at Khokand, not even sparing the life of his own relatives. Moreover, notwithstanding these internal commotions, he appears anxious to pick a quarrel with Russia. Mirza Khan, his former adviser, who was favourable to a Russian alliance, has fallen into disgrace, his place being filled now by Mir Alim Bey, an avowed enemy of Russia. Russian travellers who have recently visited Khokand have been treated with scant courtesy, and if Khuduyar means to act up to his assertion that "he need only draw his sword to compel Russia to retreat in confusion," he may very soon find himself involved in fresh difficulties. Up to the present time the Russians have evidently abstained from any act which might increase his embarrassments, and Abu Kazim, a youthful relation of the khan's, residing at Khojent, to whom the rebels applied with a view of raising him to the throne, has been removed by them to a greater distance from the scene of conflict.

Khiva is destined eventually to be incorporated into the Russian Empire. The khan declares himself powerless to check the raids of the Turkmen, unless assisted by the Russians, and owing to many former sources of revenue having dried up, and the poverty of his subjects, he will not be able to continue paying the instalments of the war indemnity.

We take this opportunity to place on record the astronomical determinations of the principal positions in the oasis of Khiva, for which we are indebted to Captain Solimani, who accompanied the late expedition against the Khanate.

	Latitude.			Longitude E. (Greenwich).		
Kasarma.....	44°	46′	3″	58°	11′	33″
Daulet Girei	44	29	53	58	10	43
Kabanbai	44	13	47	58	16	20
Kaike	44	2	42	58	21	16
Jany-kala	43	33	55	58	39	31
Kungrad.....	43	4	28	58	54	39
Mangyt	42	6	19	60	5	31
Bagh-i-Khan	41	24	0	60	23	14
Kosh-kupir.....	41	32	10	60	22	44
Khiva (Palace) ...	41	22	46	60	24	28
Kazavat	41	33	49	60	12	48
Tash-hauz	41	50	22	59	59	20
Ilally	41	52	31	59	38	33
Kunia-Urgenj ...	42	18	29	59	9	18
Khanki	41	27	30	60	47	17
Kuvansh-Jarma...	42	27	0	59	33	2

The longitudes depend upon that of Irgiz, which was determined in 1867-68 by Colonel Tillo.

Death of Captain Moreau in Burma.—In our last number we had occasion to notice the death of Captain Fau, an engineer officer of promise, who, with Captain Moreau, had accompanied the French mission to Burma, with the hope of exploring some of the unknown portions of that kingdom. This melan-

choly event has now been followed by the death of Moreau, who has also fallen a victim to jungle fever while discharging the last duties of friendship in accompanying his friend's corpse to Mandalay.

The Swiss Alpine Club held its annual meeting on the 23rd of August, at Sitten. M. von Torrente, in his opening address, gave an historical and scientific description of the canton of Wallis. M. Zähringer, of Luzern, the President, then read the annual report, from which it appears that the Club now numbers 1712 members, and has 1040*l.* invested in good securities. The meeting resolved to continue the publication of the Club-book on Glaciers, and to devote 240*l.* to an examination of the Rhone glacier. The excursions in 1876 will be directed to the Alps of Glarn and Bünden.

Signor Cora's Journey in Turkey.—Signor Cora proposes to devote the remainder of the autumn to an exploration of various portions of the interior of Albania and Rumelia, of which little is at present known, and which on the best maps are exhibited as mere blanks. The possible commercial and scientific importance of any endeavours to open up a comparatively unknown region in the heart of Europe is very great, and Signor Cora deserves credit for the disinterested energy he is showing in setting about this self-imposed task. According to present arrangements, he will cross over to Avlona, a small town on the coast of Epirus, and thence make his way across the continent to Salonika, taking height observations with an aneroid, and laying down a route survey as he proceeds. He will return to Brindisi by way of Janina and Corfu, or Athens, Corinth and Corfu.

New Map of Arctic North America.—A French missionary, Père Petitot, has just presented to the Paris Geographical Society a map drawn by himself, on the scale of 1:75,000, showing the course of the Mackenzie River from the Great Slave Lake to its *embouchure* in the Frozen Ocean. Our readers can appreciate the drawbacks attending any attempt to explore this region, when they call to mind the fearful severity of the climate and great difficulty of communication between the isolated Hudson's Bay forts except in summer. Since 1846, these hardy French missionaries have energetically prosecuted their task of evangelizing the Indians who supply furs to the Hudson's Bay Company, and have taken part in their hunting expeditions, camped beneath the same tents, and eagerly shared their privations and dangers. A series of missions have thus sprung up, which, in 1863, were consolidated into a Vicariate Apostolic, which is, year by year, extending further towards the Arctic Ocean. The Indians inhabiting these parts comprise the Dog-Rib, Hare-Skin, and Slave, and, during his ten years' sojourn among them, Père Petitot has compiled complete vocabularies of their languages. He has also acquired topographical information respecting the northern portion of the continent, inhabited by Esquimaux, and contributes interesting details of various tracts of country not explored previously.

ERRATUM.

In our last number, p. 310, throughout the abstract of Sir George Campbell's paper "On the Peoples between India and China," *for* Siam, *read* Assam.

Correspondence.

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To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—When Lord Hastings held in India the two offices of Governor-General and Commander-in-Chief, the Most Noble the Commander-in-Chief, K.P., used to write formal letters to the Most Noble the Governor-General in Council, K.P., with well-reasoned applications, to which the Most Noble the Governor-General in Council would reply with equal formality, and sometimes with an equally well-reasoned refusal.

Now, I don't want a refusal, whether well or ill-reasoned; but I wish the Editor of the *Geographical Magazine*, C.B. would write a letter to the late Editor of *Ocean Highways* (New Series), C.B., and ask that gentleman—"not to put too fine a point on it"—*What has become of his* INDEX?

I have deferred binding my copy in hope; but hope is waxing faint and my numbers are tumbling to pieces. All owners—at least all users—of those valuable twelve numbers will surely back my application.

Ocean Highways indeed! What sort of highways are those that have neither landmark nor finger-post? Even a benighted Latin Poet seems to have anticipated our hard case, and pointed to the party who is expected to provide a remedy:—

"Caligine tetrâ
Nox vastum premit OCEANUM, dum longius acti
Ludibrio ventis Jacimur: nec se Cynosura
Nec ductrix profert Helice; nobis INDICE dempto
Quis miseris monstrabit ITER, quis lumina reddens
Adstabit CLEMENS superûm?"

Yours faithfully,

ESTOTILAND, *August* 1874. ZICHMNI.

P.S.—Whenever I write my own name I feel as if I had spelt it wrong; but to make sure, you may apply at the Hakluyt Society's Rooms, asking for Nicolo Zeno (the younger).

—:o:—

"TELEGRAPH AND TRAVEL."

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Will you allow me space for a word or two, with reference to Colonel Yule's Review of *Telegraph and Travel*, in your October number?

The map, remarked on in a foot-note, was taken at a late hour, as the best procurable. A revision of the spelling, to have been effective, should have been *thorough*; and it was felt that such procedure would have had its inconveniences. Not every reader would have been necessarily aided thereby in identification of localities; nor would there be, necessarily, difficulty for any to recognize, in the modified nomenclature of the text, the faulty but familiar designation of places heretofore received. As regards the alleged expediency of exceptive orthography, my own humble opinion is that we should make no exception; nor, while simplifying the process of accentuation, by the reduction of signs and points to a *minimum*, should we hesitate to let "Caunpore" and "Calcutta" succumb to the system of transliteration which converts "Muscat" into "Maskat," and "Czar" into "Tsar." Purely conventional spelling in these cases is liable to become matter of legitimate dispute: true spelling, under fixed scientific rules, can hardly labour under a like disadvantage.

For those interested in the question of Caspian timber and Russian domestic architecture, I am bound to state that the figure 3—so pleasantly alluded to by Colonel Yule—should have been 13; as I long since found it written in my diary, when the printer's mistake had become apparent to myself—too late, unfortunately, for correction.—I remain, &c.,

F. J. GOLDSMID.

16*th October* 1874.

Proceedings of Geographical Societies.

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VIENNA GEOGRAPHICAL SOCIETY.

THE AUSTRO-HUNGARIAN POLAR EXPEDITION.

THE Society met on the 29th of September to do honour to the Polar Explorers who had been absent more than two years from their midst. Among those present were the Crown Prince Rudolf, Patron of the Society; Archduke Rainer, President of the Arctic Committee; Count Wilczek; Count Zichy; Admiral Wüllerstorff; Sir Rutherford Alcock; and many other distinguished gentlemen.

The President, Dr. Ferdinand von Hochstetter, opened the proceedings with a most impressive speech, in which he gratefully alluded to the hearty way in which so many, from the Emperor himself downwards, had striven to further the Expedition. In quoting the words of the telegraphic greeting sent by the Emperor to the leaders, Dr. von Hochstetter called upon the meeting to show equal appreciation by rising from their seats as a mark of honour. Papers were then read by Lieutenant Weyprecht on the general events of the expedition, and by Lieutenant Payer on the sledge journeys conducted by himself, and of these we give a full *résumé* below. At the close of the papers, Dr. von Hochstetter formally awarded the Honorary Diploma of the Society to the two leaders, and then read the following letter, which had been received from Sir Henry Rawlinson, President of the Royal Geographical Society:—

To Dr. F. VON HOCHSTETTER, *President of the Imperial Geographical Society of Vienna.*

LONDON, *September 17th*, 1874.

SIR,—As President of the Royal Geographical Society of London, I hasten to convey to you our cordial congratulations on the brilliant success which attended the exploring Expedition of Messrs. Weyprecht and Payer.

The boldness and perseverance with which these officers seem to have conducted their long sledging journeys, after leaving their ship imbedded in the ice, have excited our warmest admiration, and their discovery of land as far north as the 83rd degree of latitude, entitles them to the very highest rank amongst Arctic explorers.

I have the honour to request, Sir, that you will, in my own name, and in that of the Society which I represent, and which has ever taken the liveliest interest in Arctic discovery, convey to Messrs. Weyprecht and Payer our warmest felicitations on their safe return to Austria, and assure them that nowhere are their great services to science more appreciated, or their personal gallantry more admired, than in England, where we have learnt from long and painful experience to estimate the danger as well as the value of successful Polar exploration.—I have, &c.,

(Signed) H. RAWLINSON,
President Royal Geographical Society.

LIEUTENANT WEYPRECHT'S ACCOUNT.

AFTER the departure of the 'Isbjorn,' the 'Tegethoff' steamed away in a north-easterly direction, the ice having been dispersed by a breeze from the same quarter; but towards midnight the breeze fell, and the ship's crew found themselves frozen in, about 6 miles from the coast, in 76° 22′ N. latitude, and 62° 3′ E. longitude. Lieutenant Weyprecht was flattering himself that after the continuance of the sou'-westers which they had experienced, an easterly wind would set in and release them from their fix, instead of which calms, with occasional west winds, prevailed; while the latter brought in their train plenty of snow, which, with the rapid fall in the temperature, cemented the ice-blocks and shut them in inextricably. On the 9th of September a fresh breeze sprung up from the north-east and dispersed the ice into detached floes, but the 'Tegethoff' still remained in the middle, and all efforts to free her by hand or by getting up steam proved fruitless. An E.N.E. breeze drove them rapidly in a W.N.W. direction, as far as 76° 35′ N., and 60° 18′ E. of Greenwich, and then the wind veered round to the S.W. and drove them back. On the 5th of October the coast of Novaya Zemlya was lost to sight, and the pressure of the ice increased so that on the 13th the floe in which they were fixed crumbled to pieces, and the vessel was forced up above the level of the surrounding ice on to her larboard side. During the whole winter the pressure continued, and the constant changes in the position of the ship, as well as the critical state of affairs in general, warned the leaders to prepare for abandoning her in case of need. Accordingly coals and provisions for ten months, two boats, and materials for constructing a house were partly brought up on deck, and part placed on the ice. During the time that the pressure of the ice lasted, *i.e.*, until the end of January, the state of affairs was most disquieting, for the cracks and fissures in the floes made it necessary for the crew continually to shift their quarters, and so little rest was possible that they hardly ever laid aside their clothes. The sun was last seen on the 19th of October, and on the 23rd the windows were covered up, and an awning erected from the mainmast forward, the after part of the vessel being taken up with the provisions and stores, which had to be handy in case of an emergency. A rampart of snow had been erected round the vessel, but this had to be renewed because it was undermined by cracks in the ice. The general health of the party, in spite of these anxieties, was satisfactory; a few cases of scurvy had appeared, it is true, but these soon disappeared with the aid of lime-juice, while Weyprecht did not omit, by exercises and by reading and instruction, to provide against the evils of inaction. The cold was easily borne, though by February the thermometer had sunk to 46° C. During the winter the ship drifted first to the north-east, reaching its most easterly point (73° 18′ E. of Greenwich, and 78° 42′ N. latitude) on the 4th of February 1873, and then to the north-west. On the 16th of February the sun was seen again, but it was not until the 7th of April that the intense cold admitted of the windows being uncovered, and the awning removed. On the 15th of April they began to try and free the vessel; the ice wall round her was removed, and the rudder disengaged, the ship being slightly raised aft, and still leaning over to the larboard side. Weyprecht caused twenty-one holes to be bored in the ice round the vessel, and then endeavoured to make a sort of dock or canal by sawing through the intervening ice. But this proved impossible as the ice was but in few places thin enough for the saw to be of any use; while in a good many instances, after sawing through 12 or 20 feet of ice, down to the water, another layer of ice was discovered below. Heavier and longer saws were brought into play, and chisels and boring implements were used, blasting being even resorted to, but all in vain. Although eventually the fore-part of the vessel lay in a sort of open dock, the after-part was still fixed in ice of prodigious thickness. During the summer the removal of the ice made the head settle down still more, and in August she heeled over to her larboard side as to require to be supported by spars and yards. In September the young ice began to form and necessitated the digging out the vessel being broken off. But the work had shown that the men were in full possession of their strength; and a great number of bears were shot, the flesh of which contributed to keep the party in health.

On the 30th of August, while in 79° 43′ N. latitude, and 60° 23′ E. longitude, an unknown land was discovered,

extending for some considerable distance westward and northward. It was called by its discoverers Emperor Francis Joseph Land, and a conspicuous promontory was named Cape Tegethoff. During September and October they were driven past the coast, and at the beginning of October crossed the 80th parallel. In the early part of November the floe which had by this time decreased considerably in size, was driven up against one of the islands which fringed the coast, and the 'Tegethoff' was thus frozen in in 79° 51 N., and 58° 56' E. longitude.

An unlucky accident happened on the 28th of March to a sailor named Stiglich, who shot himself badly in the left arm, but owing to the constant care of Dr. Kepes the wound was healed before the return homeward. During the following months the two Norwegian fishing-boats and the second pinnace, averaging each 16 feet long, were got ready for the return, and, as previously mentioned, were fixed upon sledges, each being laden with a good supply of provisions, among which were pemmican, preserved meat, pease-pudding, meal, bread, chocolate (that for eating having been found quite invaluable), and spirits of wine for cooking purposes. All the diaries and zoological collections had unfortunately to be left on board.

On the 20th of May the vessel was abandoned, but the route chosen was so wretchedly bad that half the crew could barely drag along one sledge, or one boat at a time. Every inch of the route had thus to be traversed over five times. Between the ice-blocks there lay deep snow, the surface of which had frozen into a thin crust, and through this the travellers broke at every step. Often they sunk up to their waists, and in order to rest were compelled to lean on their hands and knees. In the teeth of these difficulties progress was very slow, and half a mile was the very utmost that could be done. On the 1st of June an impassable lane of water was reached, and as this necessitated a halt, Weyprecht took the opportunity to return to the ship for the jolly-boat; but it was not till the 17th that a north wind sprung up and dispersed the ice enough for the boats to be launched. During the ensuing week progress was still very slow and wearisome, for the constant alternation of ice and water obliged them ever and anon to take to the sledges and pack the boats or *vice versâ*; while at other times they had to lie idle for days at a time in order to wait for changes in the ice. Moreover, a south wind soon sprung up and baffled their best efforts by driving them back in a contrary direction to that in which they were going. On the 15th of July they found themselves again in the neighbourhood of a small island, only 5 miles from the ship. But a release was at hand. On the same day a north wind set in, and in a few days so much way was made that on the 23rd the 79th parallel of latitude was passed. On the 15th of August the open sea was reached in latitude 77° 40' N., and 61° E. of Greenwich, and the sledges broken up. Each boat's crew was then divided into two watches, who took it in turns to row, and the wind having calmed, the mountains of Novaya Zemlya appeared in sight on the following day. The provisions had now dwindled down to three weeks' supply, but they were so anxious to haste homeward that they did not stop to replenish their stock from the depôt which Count Wilczek had left. On the 18th of August, the Emperor's birthday was again celebrated, though not with such luxurious means as they had at disposal two years before: the boats were drawn up ashore and the night passed on dry land. No vessels were to be seen in the Matochkin Sharr Straits, though Weyprecht had confidently expected to find a Norwegian fishing vessel here, and his hope now was to fall in with a Russian salmon fisher in some of the rivers north of Goose Land. Should this prove in vain it was resolved to make for the White Sea. On the 24th of August, about 6 o'clock in the evening, while in the mouth of the Puhova River (72° 40' N. latitude) they fell in with a boat belonging to the Russian schooner 'Nicolai,' and having been hospitably received by the captain, Feodor Boronin, they chartered the vessel for 1200 roubles to convey them to Vardö, in Norway.

The health bulletin improved from the moment they left the 'Tegethoff.' During the whole period, Weyprecht considers that the behaviour of the crew was most excellent; punishments were very rarely resorted to, while no cases of insubordination occurred. Under the most trying circumstances he never noticed any despondency, and it is a noteworthy fact that the cold was so easily borne that some of the crew never put on their furs.

The scientific results are most extensive, comprising as they do the discovery and partial exploration of a large tract of unknown land, as well as meteorological, magnetic and other observations made during two years at a station far removed from any other.

LIEUTENANT PAYER'S ACCOUNT.

THE object of the Austro-Hungarian Expedition was not the exploration of land north-east of Spitzbergen and Gillis Land, though, as it has turned out, this is the real result of their labours. Their idea was to cruise along the northern coast of Siberia, having been induced to select this route on account of the great successes achieved in this direction by Norwegian fishermen the previous year. But though they reckoned on finding the sea of Kara free from ice, they never went so far as to expect an open Polar Sea. And the justice of their view is confirmed by their researches, which prompts them to go further and declare the futility of any attempts to reach the North Pole by this route.

The 'Tegethoff,' 220 tons, was fitted out for three years, and with a crew of twenty-four men left Bremen on the 13th of June 1872, and Tromsö on the 14th of July. The pack was encountered in 74° 30' N. latitude, which, with the low temperature prevalent, denoted an exceptionally unfavourable year. Immediately after Count Wilczek's departure (as detailed in Weyprecht's narrative) they were shut in, and for fourteen months they were, to use Payer's words, mere passengers on board an ice-floe. After two months' forced inaction, the pressure of the ice began, and compelled constant watches to be set. Although plenty of bears came within the vicinity of the vessel, and sixty-seven of these fell victims to their curiosity, still constant anxiety made the general bill of health anything but a clean one. A hut had been erected out of coal so as to serve as a place of refuge in case of the breaking up of the vessel, but this structure was unfortunately destroyed by a movement of the ice. The year 1873 arrived, but they were still in great perplexity, and having drifted beyond 73° E. longitude imagined that they were being borne towards Siberia. But February came, and with it the wind changed and drove them to the north-west, while soon after the sun re-appeared. Numerous efforts were then made to free the ship from her imprisoning floe, but all proved in vain, and it was then necessary to prop her masts so as to prevent her heeling over entirely. During July north winds had driven them southward, but with the approach of August south winds set in and drove them further to the north.

The Expedition was now in a perfectly new region, but it was nevertheless with much surprise that on the 31st of August they suddenly beheld, at a distance of 14 sea miles, a lofty mass of land loom out of the mist. Icebergs also appeared for the first time. The cracks in the ice were so numerous that no landing could be effected, and for more than a month they were doomed to gaze upon this mysterious land without being able to set foot on it; but towards the end of October they were driven up against Wilczek Island, and all fear of drifting off was, for a time at least, at an end. The long Polar night—125 ordinary nights' length—had now set in, and all thought of exploring the new land had to be abandoned till the spring. The cold proved very severe, the quicksilver remaining frozen for weeks, and

the darkness in the depth of the winter was intense; but in spite of this 1200 lbs. of fresh meat was got, thanks to the bears. On the 10th of March, Lieutenant Payer set out with six men, three dogs, and a large sledge to explore the western land, and travelling in a north-western direction, ascended Capes Tegethoff and Mc Clintock, and crossed Nordenskiold Fiord, in the interior of which is situated the Sonklar Glacier. The glaciers were grand and desolate, and the dolomite rocks rose in bold outline; their column-like supports sparkling with brilliancy owing to the recent abundance of snow. This dampness also occasioned an abnormal circumstance in Arctic Regions—distances appeared less than reality. During this time the cold was intense; every article of clothing was frozen like metal plates, and strong rum lost all its potency and fluidity. On the 16th preparations were made for a second and more complete exploration, and, on the 24th the party set out northwards. The temperature had risen about 14° R., and Payer accordingly prepared for weak ice, snowdrifts, and other contingencies.

The Lieutenant thus sums up the result of their exploration:—The land discovered was about the size of Spitzbergen, and consisted of two large masses east and west, named Wilczek and Zichy Land respectively, both being indented with numerous fiords, and surrounded with numerous islands. A broad channel named Austria Sound runs northward from Cape Hansa, and separates these two, branching off at about 82° N. latitude into a broad north-easterly opening called Rawlinson Sound, the land on the further side being called Crown Prince Rudolf Land. This sound was followed as far north as Cape Pesth.

The horizontal terraces and bluff table-like mountain summits suggested reminiscences of Abyssinia, and gave this region a character which, in Payer's opinion, bore a strong resemblance to the configuration of North-East Greenland. The average height of the peaks was between 2000 and 3000 feet, but to the south-west the mountains rose to the height of 5000 feet. Between the mountains were vast depressions filled with gigantic Arctic glaciers, and these necessitated a circuitous course. The coast was bordered by cliffs between 100 and 200 feet in height.

In respect of vegetation, there is scarce a poorer land on the face of the globe, Greenland, Spitzbergen, and Novaya Zemlya being all far more favoured. Animal life too, with the exception of bears, is extremely scanty in the south. Driftwood was often met with, but neither in large quantities nor of old date.

The entire mass of land discovered was called after his Imperial Majesty the Emperor Francis Joseph, as chief promoter of the Expedition. Detached capes were named as follows, Cape Koldewey 80° 15′, Cape Frankfort 81° 25, Cape Ritter 80° 45′, Cape Kane 80° 10′, and Cape Fligely 82° 5′ N. latitude. A huge ice-flow of recent formation extended from one side of the sound to the other, and was seamed with fissures and studded with hummocks to such a degree that progress across it was extremely difficult. Without going into details, it may suffice to say that on the 26th of March an extensive island named Salm Island was passed on the 80th parallel. On the 3rd of April the 81st parallel was reached, and five days afterwards the latitude of 81° 37′, which at the time the explorers imagined to be the northernmost known land on the globe. The diminution of provisions warned them to lose no time in pushing northward, and the party was accordingly split into two, one portion remaining in latitude 81° 38′ under the rocky cliffs of Hohenlohe Island, while the others, under the leadership of Payer, crossed over with the dogs to Crown Prince Rudolf Land. Their way lay across the Middendorf glacier, and while traversing it a sailor called Zaninovich, the dogs, and one of the sledges all disappeared down a crevasse. Eventually they were extricated, and Crown Prince Land was reached. Here a surprising change took place in the weather, the sky to the north assumed a dark-blue colour, yellow mists ascended in the sunlight, and the road became easier. The cliffs were covered with thousands of little auks and ducks, while there were traces of bears, hares, and foxes, and seals lay upon the ice. Nevertheless, this was not enough to convince them of the existence of an open Polar Sea. Close to the Auk Cape began open water, and here the extreme beauty of the Arctic scenery appears to have greatly impressed Payer. The 12th of April was the last day of their northward trip. Leaving the sledge on a rocky promontory called Cape Germania, 81° 57′ N., they followed the coast line which here trended to the north-east as far as Cape Fligely (82° 5′ N. latitude). Looking northward the first impression was that the sea was indeed comparatively free from ice and navigable, and Payer thinks that a vessel could have easily pushed northward from Zichy Land for a distance of from 10 to 20 miles. But he hastens to say that this was but a momentary impression, and that *frequent* and *careful* observation would be requisite to confirm any deduction as to the normal character of the sea there. In the distance land was seen which appeared to stretch beyond 83° N. latitude, and to be girt by a sound running north-west and north-east. This was named Petermann Land, and an imposing promontory to the west was called Cape Vienna.

Without venturing any conclusion as to the continuity of the land with Gillis Land, it may be safely asserted that it forms part of an Arctic archipelago. The presence of icebergs within the sounds of Francis Joseph Land, and their absence in the seas around Novaya Zemlya, is a noteworthy fact.

A document was left in a cleft of a rock showing that this region had been visited, and the party set out to regain the ship, 160 miles to the south.

Ladenburg Island was passed, and on reaching Cape Ritter they found that the sea-water had penetrated the lower coating of snow, and that a misty atmosphere, denoting open water, lay before them, as well as over the entrance to an extensive sound, called Markham Sound. The next day they stood on an iceberg, near Hayes Island, and saw open water before them flowing rapidly northward. After wandering a good deal out of their course, they eventually regained the ice, near Cape Frankfort, and on the 10th of April found to their joy that the ship had not drifted away, but was still frozen fast on to the shore of Wilczek Island.

A third expedition was made westward, and from the top of a mountain named Richtofen Peak, they were enabled to see that the new land extended as far as 46° E. longitude, and that it was indented by numerous fiords.

After a base had been measured by Lieutenant Weyprecht, preparations were made for the return homewards, and on the 20th of May the colours were nailed to the mast, and the crew started for the south. The rest of Lieut. Payer's narrative, detailing the return journey, is nearly identical with that of Lieutenant Weyprecht, given above.

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